

**International Studies Program
Working Paper 07-15
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Capital Income Tax Add-On to
A Consumption Tax**

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Economic Effects of A Personal Capital Income Tax Add-On to A Consumption Tax

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Abstract

Although much academic and policy discussion has focused on replacing the income tax with a consumption-based tax, very few consumption-based direct tax reforms have been enacted. Much more common are approaches that reduce the level of capital income taxation under an income tax, including the current Nordic “dual income taxes” and similar approaches recently proposed in Germany, Switzerland and the United States. This paper examines the general economic case for such reforms and then reports the results of a simulation of the economic effects of implementing such a capital income “add-on” tax to a consumption tax structure in the U.S.

Keywords: Income tax reform, dual income tax, dynamic modeling, overlapping generations computable general equilibrium model

JEL Classification Codes: H20, H24, H25

¹ We would like to thank the participants at a conference on “Alternative Methods of Taxing Individuals,” sponsored by the Andrew Young School of Policy Studies, International Studies Program, Georgia State University, Atlanta, Georgia, June 8-9, 2006 for helpful comments and Preen Bathia for excellent research assistance. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Baker Institute for Public Policy.

1. Introduction

Recent discussions of tax reform have focused on replacing the federal income tax with some form of consumption-based direct taxation. However, very few direct consumption taxes have actually been implemented around the world; the most prominent example is the plan enacted in Croatia in 1994 but repealed in 2001 (Rose and Wiswesser, 1998; Keen and King, 2002; Zodrow, 2003). Much more common are reforms that reduce the taxation of capital income within the context of an income tax.² The most prominent example of this approach is the Nordic “dual income tax,” under which labor income is taxed at progressive rates but capital income is taxed at a flat rate, typically equal to the minimum tax rate applied to labor income. Such taxes were first enacted in the late 1980s and early 1990s in Denmark, Sweden, Norway and Finland, and broadly similar schedular reforms have subsequently been implemented in numerous other countries, including Austria, Belgium, Italy, Greece and the Netherlands (Nielsen and Sorensen, 1997; Genser, this issue).³ Similarly, the President’s Advisory Panel on Federal Income Tax Reform in the United States decided against recommending a true consumption-based tax, and instead, in addition to a reformed and integrated income tax, proposed a consumption-based system (with a business tax that allowed expensing of capital purchases but no interest deductions) supplemented with an “add-on” capital income tax at the individual level (the “Growth and Investment Tax”).^{4 5}

These developments reflect the current state of the debate regarding the relative desirability of income-based and consumption-based direct taxes. Specifically, there is widespread agreement that an “ideal” or comprehensive “Schanz-Haig-Simons” accrual-

² Although a consumption tax is often described as exempting capital income, this characterization is misleading; as stressed by Hubbard (2002), only the normal return to capital is exempt under a consumption tax, while above-normal returns and returns to risk-taking are taxed similarly under both consumption and income tax regimes.

³ In addition, Germany is currently considering implementing a dual income tax (Spengel and Wiegard, 2004), as is Switzerland (Keuschnigg, forthcoming).

⁴ See Zodrow and McLure (2006) for a discussion of the panel’s report. A similar plan, based on the “allowance for corporate equity” or ACE approach to the business-level tax (Devereux and Freeman, 1991) was proposed recently in Switzerland; see (Keuschnigg, forthcoming).

⁵ An important advantage of the Treasury plan, relative to most dual income taxes, is that it is more conducive to attracting foreign direct investment since the marginal effective tax rate applied to new investment at the business level is zero, with interest, dividends and capital gains taxed at the individual level (Altshuler and Grubert, 2006).

based tax on real economic income is not administrable, and less but still considerable agreement that the taxation of the normal returns to capital inherent to an income tax is relatively undesirable. On the other hand, many observers are unconvinced that a true consumption tax is desirable or could be implemented, citing uncertainty about the magnitudes of the associated efficiency gains and improvements in administrative and compliance simplicity and its distributional implications and transitional problems.⁶ In this context, it is not surprising that the political process in many countries has exhibited a tendency to arrive at a compromise position such as the U.S. tax panel's Growth and Investment Tax (hereafter, GIT) or the dual income tax (hereafter, DIT).

In this paper, we compare the economic effects of such an approach to tax reform, relative to the enactment of a pure consumption tax such as the Hall and Rabushka (1983, 1995) Flat Tax. In the following section, we review briefly the income vs. consumption tax debate, including the conditions under which it may be desirable to tax capital income at a rate that is positive but lower than the maximum rate applied to labor income. We then provide the results of some simulations that estimate the economic effects of adding on an individual-level flat rate capital income tax to a consumption-based business cash flow tax (such as the Treasury's GIT), relative to the case of implementing a revenue neutral "pure" consumption tax under which interest income, dividends and capital gains are exempt from tax at the individual level (the Flat Tax). Our simulation model and its calibration are outlined briefly in Section 3. Section 4 provides the simulation results and some conclusions are offered in the final section.

2. Theoretical Arguments

Given the above discussion, a natural question is whether the economic literature supports a relatively low rate add-on tax on capital income imposed at the individual level. Such an approach would seem to be undesirable on simplicity grounds, as it requires that the full complex apparatus of taxing capital income be maintained in order

⁶ For recent collections of articles that reflect the current status of the debate on these issues, see Aaron, Burman and Steuerle (forthcoming), Auerbach and Hassett (2005), and Zodrow and Mieszkowski (2002).

to raise a relatively small amount of revenue.⁷ However, it is certainly possible that a positive but relatively small level of capital income taxation would be desirable on either efficiency or equity grounds. This section provides a brief overview of the voluminous literature on the efficiency aspects of this issue⁸; because the current version of our simulation model assumes a representative individual in each generation, we are unable to address intragenerational equity issues in this paper.⁹

The most striking result in the literature on the relative merits of income and consumption-based taxation is due to the seminal contributions of Judd (1985) and Chamley (1986), who analyze optimal capital and wage income taxation in models in which individuals are assumed to be infinitely lived.¹⁰ In this context, Judd and Chamley show that in the long run the optimal capital income tax rate is zero. This result arises because a capital income tax increases the price of future consumption relative to current consumption by reducing the after-tax interest rate. Although this distortion may be modest over a short time interval, it increases exponentially with time, so that even a small capital income tax rate will eventually be highly distortionary. Since the individuals in these infinite-horizon models have perfect foresight, their consumption patterns are highly distorted by such a tax, with significant declines in saving and capital accumulation and large efficiency costs. A second message of these models is that even though capital income taxation should be avoided in the long run, existing capital should be taxed to the maximum extent feasible since, assuming that such a tax is not anticipated nor expected to be repeated, it represents a nondistortionary or “lump sum” source of revenue. Although the practical relevance of this point may appear to be limited, the

⁷ This point is stressed by Shaviro (2005).

⁸ The following discussion draws on Zodrow (2006, forthcoming); see also Auerbach (2006).

⁹ Note, however, that capital income taxation is not necessarily needed to achieve society’s vertical equity goals. The most important result on this topic is due to Atkinson and Stiglitz (1976) who show, within the context of a multi-period life-cycle model in which people differ only in their skill levels, that capital income taxation (modeled as differential taxation of consumption in different periods) is unnecessary if leisure and the various consumption goods are separable in the utility function and a progressive tax on wage income is set optimally. Moreover, Kaplow (2004) extends this result to the case in which the tax on wage income is suboptimal. In addition, capital income taxes have also been justified as proxies for taxes on wealth and on bequests and inheritances.

¹⁰ This assumption can be justified as approximating the “altruistic” case in which the utility function of parents includes the utility function of their children.

implementation of a consumption tax may, depending on the transition rules used, be accompanied by such a one-time capital levy – this point is discussed further below.

Although the Judd and Chamley result is powerful, its policy implications are limited, both because of questions regarding the validity of models that assume infinitely-lived individuals and because such models are incapable of addressing the critical issues related to intergenerational redistributions and transitional problems that are raised by consumption tax reforms.¹¹ Accordingly, most policy analyses of consumption tax reforms have focused on life-cycle models with an overlapping generations structure.

The results of such life-cycle analyses are more ambiguous. In the simplest two-period version of the life-cycle model, the optimal capital income tax rate is zero (implying uniform taxation of consumption in both periods, as would occur under a consumption or wage tax) only if first and second period consumption are equally complementary with leisure (Auerbach and Hines, 2002). This result reflects a balancing of two considerations. Uniform consumption taxation tends to be efficient, as it avoids tax distortions of intertemporal consumption allocation decisions. However, the inability to tax leisure directly implies that consumption taxation will inefficiently reduce labor supply, so that differential taxation of consumption goods will be desirable if it can be used to offset the tax-induced increase in leisure demand and the associated reduction in labor supply. If consumption in the two periods is equally complementary to leisure and thus affects labor supply in the same way, any rationale for differential taxation disappears, and uniform commodity taxation (a capital income tax rate of zero) is optimal. This condition is satisfied if the individual utility function is homothetic and separable in leisure and the two consumption goods (Auerbach, 1979), conditions that arguably represent a reasonable benchmark for individual preferences (Atkinson and Stiglitz, 1980).¹²

¹¹ For example, see Mieszkowski and Palumbo (2002) and Zodrow (2002).

¹² Homotheticity implies that increases in wealth are distributed proportionately across consumption in all periods and separability requires that decisions regarding choices among consumption commodities be independent of the decision regarding how much labor to supply (leisure to demand).

The analysis of income and consumption taxes within the context of the basic two-period life-cycle model was extended to the multi-period case by Summers (1981) and Auerbach and Kotlikoff (1987); these seminal contributions launched a huge literature that has used dynamic overlapping generations life-cycle computable general equilibrium (CGE) models to simulate the economic effects of replacing income taxes with consumption taxes. Summers emphasized that an increase in the tax rate on capital income reduces the after-tax discount rate individuals use in estimating their human wealth – the present value of all future labor earnings – when making consumption and savings decisions. The resulting increase in human wealth prompts greater consumption early in life, that is, less saving. The simulation results reported by Summers suggested that enactment of a consumption tax reform could result in quite large steady state welfare gains.¹³ The Summers model, which assumes myopic expectations, fixed labor supply and exponential wage growth, was significantly extended by Auerbach and Kotlikoff (hereafter, AK) in a model that, among many other things, assumes perfect foresight on the part of both individuals and firms, allows labor-leisure choices in each period, and assumes a “hump-backed” wage profile over the life cycle taken from the labor economics literature. Partly because of such differences and partly because they use more conservative parameter values than those utilized by Summers, the AK simulations indicate somewhat smaller, but generally still positive, long run increases in economic growth and individual welfare from implementing a consumption tax reform; broadly similar results are reported in the subsequent extensions by Auerbach (1996) and Altig, Auerbach, Kotlikoff, Smetters and Walliser (2001) (hereafter, AAKSW).¹⁴ In addition, all of these papers stress that the taxation of old capital during the transition to a consumption tax is an important source of its efficiency gains; of course, this one-time capital levy does not occur if existing capital is protected with sufficiently generous transition rules.

The analysis thus far suggests that consumption taxation is preferable to income taxation on efficiency grounds and that a consumption tax reform is likely to increase economic growth and individual welfare in the long run. However, a wide variety of qualifications

¹³ For example, in one central case, the enactment of a cash flow consumption tax results in a steady state welfare gain equal to 11.2 percent of lifetime income.

¹⁴ See also Fullerton and Rogers (1993).

to these results have appeared in the literature. For example, some have argued that the savings responses implied by the infinite horizon and life-cycle models are far greater than those observed in the empirical literature (Ballard, 2002; Gravelle, 2002), suggesting that the efficiency gains from consumption tax reform, especially from eliminating rather than simply reducing the taxation of capital income, may be relatively small. In particular, savings responses in these models are dampened if one uses more conservative parameter values, especially for the intertemporal elasticity of substitution, allows for minimum required purchases (so that less income is discretionary), or adds a target bequest motive (so that an increase in the after-tax rate of return actually reduces saving since the target bequest is more easily achieved).

A more fundamental theoretical point is raised in a recent paper by Erosa and Gervais (2002) (hereafter, EG), who conduct an optimal taxation analysis that addresses the question of whether a positive capital income tax may be desirable in an overlapping generations, perfect foresight model.¹⁵ EG construct a model similar to AK, except that the government has access to age-dependent taxes on labor income (and also has complete flexibility with respect to its debt policy). In order to calculate “optimal” tax rates with multiple generations, the government is assumed to maximize a weighted sum of individual utility levels across generations.

Calculating optimal wage and capital income tax rates is significantly more complicated in this setting. EG show that a capital income tax rate of zero is optimal if (1) the standard conditions for uniform taxation (homotheticity and separability of leisure and consumption) are satisfied, and (2) age-conditioned labor income tax rates are set appropriately. Age-conditioned labor income tax rates are required because (in contrast to infinite-horizon models where steady state consumption and leisure are constant) consumption and leisure vary over the life cycle in an overlapping generations model. Specifically, because leisure demand tends to increase (or be U-shaped) and consumption demand increases over the life cycle, the optimal wage tax rates also vary over the life cycle. For example, the optimal tax rate on labor income is relatively low (increasing the

¹⁵ See also Garriga (2003).

opportunity cost of leisure) when leisure demand is high and relatively inelastic, consistent with the standard result of taxing inelastically demanded goods at relatively high rates (Auerbach and Hines, 2002). Since age-dependent wage income taxes are infeasible, the central issue is whether their effects can be approximately replicated with the appropriate pattern of capital income tax rates. Since the optimal time path of age-dependent wage tax rates tends to increase over most of the life cycle, EG find that some capital income taxation is in fact typically optimal. In addition, as described above, if leisure and consumption are not separable in the individual utility function, capital income taxation (or subsidization) may be desirable, depending on the relative complementarities of consumption in different periods with leisure.

In an attempt to determine the quantitative significance of their result, EG simulate optimal (constant) capital and wage tax rates in their model under a parameterization chosen to follow Auerbach, Kotlikoff and Skinner (1983), coupled with various approaches to weighting the utilities of different generations in the government social welfare function. EG show that the optimal capital income tax rate is indeed positive in their simulations, ranging from roughly 4-15 percent, which is approximately 30-35 percent of the optimal tax rate on wage income. Their analysis thus provides some support for the idea that the optimal tax rate on capital income is positive but less than the optimal tax rate on labor income.

Thus, although there is arguably a presumption that consumption taxation is preferable to income taxation on efficiency grounds, this result is not obvious. In particular, a positive (but presumably relatively low) capital income tax may be desirable, or the efficiency costs of such a tax may be small (and thus might be offset by some associated equity gains, although such gains are not considered in this analysis). In this paper, we investigate this possibility within the context of a dynamic overlapping generations life-cycle computable general equilibrium model.

The model is designed to allow consideration of the various factors noted above that might make some positive capital income taxation desirable. In particular, the model (1)

assumes individual life-cycle behavior rather than an infinite time horizon, (2) assumes a target bequest motive, (3) allows for minimum consumption purchases for all three goods in the model (owner-occupied housing, rental housing and a composite consumption good), and (4) assumes the same structure of individual preferences analyzed by Erosa and Gervais (consumption and leisure are not separable, so that a zero tax rate on capital income is not necessarily optimal).¹⁶

In addition, as noted above, a key feature of any consumption tax reform, and an important source of its potential efficiency gains, is the possibility of the imposition of a one-time capital loss on existing capital owners.¹⁷ Our model is designed to calculate these windfall losses explicitly in the case of the imposition of the flat tax and the “flat tax plus capital income tax add-on” reform options analyzed in this paper.¹⁸

First, the imposition of a flat tax might impose a loss on the owners of business equity. Expensing under a flat tax implies very generous tax treatment of new investment – a marginal effective tax rate of zero. However, in the absence of transition rules, firms would not be allowed to deduct the remaining basis of existing depreciable assets, although their returns (and the proceeds of asset sales) would be included in the tax base. As a result, the rate of return on existing assets would fall relative to the return on new investments, and arbitrage across new and existing assets would imply that the value of existing assets would fall; Gravelle (1996) constructs a simple model in which the decline is proportional to the rate of tax. Moreover, as long as the general price level remained unchanged under the Flat Tax, lenders would be insulated from this loss since the nominal value of outstanding bonds would be fixed; thus the entire reform-induced one-time windfall loss would be borne by business equity owners.

¹⁶ Note, however, that a number of factors that would affect the desirability of the taxation of capital income are not considered in our model. For example, capital income taxation may be desirable in the presence of credit constraints (Chamley, 2001), if high-skilled workers are more complementary with capital than are low-skilled workers (Salanié, 2003), or to offset labor income tax distortions of decisions regarding human capital accumulation (Nielsen and Sorensen, 1997). On the other hand, capital income subsidies may be desirable in some cases, for example if the economy is characterized by imperfect competition (Judd, 1997) or if it is desirable to attract foreign direct investment in the presence of imperfect information (Gordon and Bovenberg, 1996).

¹⁷ In addition, the imposition of such a one-time loss on existing capital owners might mitigate the distributional problems associated with implementing a consumption tax reform due to significantly lowered tax rates on high-income individuals and exemption of the normal returns to capital.

¹⁸ For additional details, see Diamond and Zodrow (2006a).

It is important to note, however, that this analysis ignores a wide variety of other factors associated with the implementation of a flat tax, most of which would act to offset the one-time windfall tax on existing assets (Auerbach, 1996; Lyon and Merrill, 2001; Zodrow, 2002). A partial list of these factors, all of which are considered in our model, includes: (1) the costs of adjusting the capital stock, which would allow the owners of capital to earn above-normal returns on both existing assets and new investments during the period of transition to the new post-reform equilibrium; (2) a short run (and perhaps a long run) increase in the after-tax rate of interest, which would allow the owners of capital to earn a higher after-tax rate of return on existing assets and new investments; (3) the reduction under a lower-rate flat tax of the expected tax on assets that were allowed accelerated depreciation allowances, including “bonus depreciation” and expensing of investments in research and development or advertising, under the current income tax (Lyon and Merrill, 2001); and (4) the efficiency gains obtained from eliminating distortions of saving and investment decisions and reducing distortions of the labor-leisure choices, as well as from improvements in the allocation of capital across alternative assets and business sectors.¹⁹

Second, the imposition of a flat tax might impose a loss on the owners of owner-occupied housing (different from that imposed on the owners of business equity). This price decline is due to a reform-induced increase in the user cost of housing, as perceived by the owner-occupier, which arises primarily because (1) normal returns to business equity investments are effectively untaxed under the Flat Tax, making such investments relatively more attractive and raising the opportunity cost of equity-financed investment in owner-occupied housing, and (2) deductions for mortgage interest and property taxes

¹⁹ The model tends to overstate transitional losses for two additional reasons. First, to the extent that the “new view” of dividend taxation is accurate, the enactment of a consumption tax reform would benefit existing assets by removing individual-level taxation of dividends that is capitalized into current asset prices; see Auerbach (1996). Because the model is based on the “traditional” view of dividend taxation, it does not capture this effect. Second, as noted previously, above-normal returns and the returns to risk-taking are treated similarly under income and consumption taxes so that little changes in tax treatment would result from reform. Since the model is characterized by perfect competition and certainty, it does not consider this factor.

are eliminated.²⁰ The increase in the user cost of owner-occupied housing that would occur under the Flat Tax would tend to reduce the demand for owner-occupied housing, which in turn would tend to result in a decline in the price of owner-occupied housing in the short run. Some estimates suggest that implementation of a flat tax could cause huge declines in the prices of owner-occupied housing, on the order of 15-30 percent (Capozza, Green and Hendershott, 1996). However, other analysts have concluded that offsetting factors imply that the actual short run decline in housing prices would be quite modest (Bruce and Holtz-Eakin, 1999; Gravelle, 1996; Hall, 1997; Diamond and Zodrow, 2006a).²¹ These offsetting factors, all of which are considered in our model, include reform-induced declines in interest rates, capital reallocation into other sectors, and conversion of owner-occupied housing into rental housing.

3. Outline of Model Structure and Calibration

The distinguishing feature of our approach is the treatment of owner-occupied and rental housing within a dynamic overlapping generations life-cycle general equilibrium model that explicitly calculates reform-induced changes in all asset values during the transition to a new tax regime. Given space limitations, we can only briefly outline the general features of the model and its calibration here; for complete details, see Diamond and Zodrow (2005, 2006a, b).

The model has three production sectors – owner-occupied housing, rental housing, and a composite good sector that includes all non-housing goods and services. The time paths of investment demands in all three sectors are modeled explicitly, taking into account capital stock adjustment costs, with owner-occupied housing “produced” by individuals who then rent housing services to themselves.²² On the consumption side, the current tax advantage of owner-occupied housing is taken into account in modeling the demands for

²⁰ The user cost of owner-occupied housing is defined as the sum of the opportunity cost of the homeowner’s equity, the after-tax cost of mortgage interest, depreciation and maintenance expenditures, and (arguably) property tax payments.

²¹ In the long run, the quantity of housing and the cost of housing would return to an equilibrium reflecting production costs and the absence of taxation, including the cost of land.

²² Note, however, that domestic saving is the only source of new capital, as the analysis assumes a closed economy.

the three goods, which reflect optimization over a 55-period life cycle that includes 45 working years and a 10-year retirement period. Bequests and inheritances are modeled assuming a relatively primitive “target model” of bequests, with fixed real values of bequests. Thus, the model allows for a fairly detailed description of both the transitional and the long run effects of implementing reform on the prices of housing and business assets.²³ The model combines various features from the well-known models of Auerbach and Kotlikoff (1987), Goulder and Summers (1989), Goulder (1989), Keuschnigg (1990) and Fullerton and Rogers (1993).

The model is calibrated using the parameter values shown in Table 1, which are chosen (1) to be consistent with empirical estimates and those used in other similar studies, especially AAKSW (2001), Auerbach and Kotlikoff (1987), Auerbach (1996), and Fullerton and Rogers (1993), and (2) so that in the year of reform the initial income tax equilibrium is broadly consistent with the prevailing features of the U.S. economy in 2003 as reflected in data from the U.S. Bureau of Economic Analysis (2004). Federal and state tax rates are shown in Table 2.

The simulations are performed for two values of the adjustment cost parameter (β^x) in the composite good production sector: $\beta^x = 0$ as a benchmark case,²⁴ and $\beta^x = 10$, following AAKSW. In the absence of data on adjustment cost parameters in the owner-occupied and rental housing sectors, these values are assumed to equal the values of the adjustment cost parameters in the composite good sector (although the values need not necessarily be equal).²⁵

²³ The treatment of housing, however, is less detailed than in some of the partial equilibrium studies noted above, since land is not considered and the model does not allow for multiple income groups within each generation.

²⁴ To ensure convergence of the model, a positive value of the adjustment cost parameter is required; the results for the “no adjustment cost case” reflect a value of the adjustment cost parameter of 0.2. Note that the recent results of Hall (2004) suggest that adjustment costs for both capital and labor are quite small.

²⁵ The model is calibrated so that in the initial equilibrium the existence of accelerated depreciation allowances including bonus depreciation implies that undepreciated basis of capital in the composite good and rental sectors is equal to \$8.3 trillion, which reflects a non-published estimate provided by Joint Committee on Taxation. For additional details on all parameter values and other variables, see Diamond and Zodrow (2006b).

Table 1. Utility Function and Technological Parameter Values

Symbol	Description	Value
Consumers		
ρ	Rate of time preference	0.004
σ	Intertemporal elasticity of substitution	0.35
ε	Intratemporal elasticity of substitution	0.6
σ_{CH}	Elasticity of substitution for composite good and housing	0.5
σ_{RO}	Elasticity of substitution for rental and owner housing	0.8
$\alpha_E(\alpha_C)$	Utility weight on leisure (consumption)	0.28 (0.72)
$\alpha_G(\alpha_H)$	Utility weight on composite good (housing)	0.75 (0.25)
$\alpha_O(\alpha_R)$	Utility weight on owner-occupied (rental) housing	0.78 (0.22)
Technology		
G (N)	Technological (Population) growth rate	0.01 (0.01)
a_X	Capital share in composite good production	0.25
a_H	Capital share in housing production	0.99
$\beta^X, \beta^R, \beta^O$	Adjustment cost parameters (all sectors)	0.2, 10
DIV_s^X	Dividend payout in the composite good sector	0.68
b^X	Debt-to-asset ratio (all sectors)	0.35
$\delta_{\tau s}^X$	Economic depreciation in the composite good sector	0.088
δ_h	Economic depreciation in the housing sector	0.019

Table 2. Federal and State Tax Rates

Symbol	Description	Value
Federal Taxes		
τ_{ds}	Dividend Tax Rate	0.12
τ_{is}	Interest Income Tax Rate	0.147
τ_{gs}	Composite Good Capital Gains Tax Rate	~0.05
τ_{bs}	Effective Composite Good Business Tax Rate	0.26
τ_{rs}	Effective Rental Housing Tax Rate	0.169
τ_{gr}	Rental Housing Capital Gains Tax Rate	0.05
τ_{go}	Owner Housing Capital Gains Tax Rate	0
τ_{wmarg}	Income Weighted Marginal Wage Tax Rate	0.252
τ_{wave}	Average Wage Tax Rate	0.21
τ_s	Social Security Tax Rate	0.1
State Taxes		
τ_c^{st}	Sales Tax Rate	0.075
τ_p^r	Housing Property Tax Rate	0.0171
τ_{ps}^X	Composite good Property Tax Rate	0.0081
τ_b^{st}	Average Business Tax Rate	0.04
τ_w^{st}	Average Wage Tax Rate	0.04

4. Simulation Results

The reform simulated is the replacement of the federal income tax system with (1) a revenue-neutral Hall and Rabushka Flat Tax (hereafter, FT) that applies the same constant tax rate to both a comprehensive measure of household labor incomes, with an exemption amount that is initially set at \$20,000 per household,²⁶ and business real cash flow (which allows expensing of all non-financial business purchases and ignores financial flows including interest expense), and (2) the same flat tax on wages and business cash flow, supplemented by an “add-on” capital income tax at the individual level on interest, dividends and capital gains at a rate of 15 percent (hereafter, AT).²⁷ Both reform plans are simulated for the cases of no adjustment costs ($\beta^X = 0$) and positive adjustment costs ($\beta^X = 10$).²⁸ The assumption of a comprehensive flat tax base implies that the required tax rate under the FT plan is 21.0-22.3 percent in the year of reform, depending on the level of adjustment costs, and gradually declines to a steady state value of 20.1 percent.²⁹ Under the somewhat broader-based AT plan, the wage tax rate is 19.1-19.7 percent in the year of reform, depending on adjustment costs, and declines to a steady state value of 18.6 percent. The following discussion first compares the macroeconomic effects of the enactment of the two plans and then their effects on the prices of business equity and housing.

4.1 Effects on Prices, Output, Investment and Capital Allocation

Tables 3-4 show that the general time paths of the wage rate and interest rate are similar under the FT and AT, with or without adjustment costs. In the year of enactment of the FT, with the capital stock initially fixed, the before-tax wage rate declines initially by

²⁶ The initial exemption amount reflects the amounts proposed in Hall and Rabushka (1995) (a standard deduction for joint filers of \$16,500 plus \$4,500 for each non-spousal dependent), adjusted for inflation and for an average household size of 2.3 working age individuals. The exemption amount grows at the steady state growth rate of the economy.

²⁷ The annual accrual individual-level capital gains tax rate, taking into account the advantages of deferral and tax exemption of death and the disadvantage of the taxation of inflationary gains, is assumed to be 5 percent.

²⁸ The simulation results are typically presented as ranges for the range of adjustment costs noted above; unless otherwise noted, the first number corresponds to the value with high adjustment costs, and the second number corresponds to the value with no adjustment costs.

²⁹ The flat tax base follows the admittedly highly optimistic Hall and Rabushka approach of assuming taxation of all fringe benefits, elimination of all deductions and exemptions other than a standard deduction and personal exemptions, and elimination of the Earned Income Tax Credit.

0.5-0.6 percent as labor supply increases immediately by 1.8-1.9 percent, depending on the level of adjustment costs. In the year of enactment of the AT, the before-tax wage rate declines initially by 0.6 percent as labor supply increases immediately by 2.2 percent, with or without adjustment costs. The increase in labor supply is a result of both an increase in the after-tax wage rate and an increase in the after-tax interest rate that causes individuals to substitute future consumption and leisure for current consumption and leisure. The labor supply increase is larger under the AT because the additional layer of capital income taxation allows for a lower tax rate on labor income and thus a higher after-tax wage rate. This effect is mitigated to some extent by higher after-tax interest rates under the FT relative to the AT in the year of reform. Under both reforms, the before-tax wage rate rises as increased saving leads to a higher capital-labor ratio; this effect is larger under the FT because of its more generous treatment of capital income. In the long run, the before-tax wage rate is 4.2 (2.5) percent higher and the capital-labor ratio is 8.8 (5.2) percent higher under the FT (AT). The long run before-tax interest rate is 1.3 (1.4) percentage points lower under the FT (AT), with more than half of the decline occurring within 10 years after reform. The after-tax interest rate initially increases by 0.8-1.4 (0.9-0.5) percentage points under the FT (AT), and then declines steadily to a value 0.2 (0.1) percentage points higher than in the initial steady state.

Under the FT, gross domestic product (GDP) increases by 1.3-1.0 percent in the year of reform and by 4.9 percent in the long run. Under the AT, GDP increases by more in the short run – 1.5-1.4 percent in the year of reform, reflecting the larger short run labor supply response to the larger reduction in the after-tax wage. However, GDP increases by a smaller 3.9 percent in the long run, reflecting the less generous treatment of capital income under the AT. Even with adjustment costs, most of the increase in GDP (4.2 percent under the FT and 3.4 percent under the AT) occurs within 20 years of the enactment of reform, as labor supply and aggregate investment increase and as capital is reallocated. Under the FT, composite good (non-housing) output is 1.5-1.4 percent larger in the year of reform and 5.2 percent larger in the long run, rental housing output decreases by 0.0-1.4 percent in the year of reform but increases by 1.2 percent in the long run, and the change in output in the owner-occupied housing sector ranges from an

increase of 0.1 percent to a decline of 1.5 percent in the year of reform and is 3.6 percent larger in the long run. Under the AT, composite good (non-housing) output is 1.6 percent larger in the year of reform and 4.1 percent larger in the long run steady state, the change in rental housing output ranges from an increase of 0.8 percent to a decline of 0.2 percent in the year of reform and increases by 1.6 percent in the long run, and the change in output in the owner-occupied housing sector ranges from an increase of 1.0 percent to a decline of 0.1 percent in the year of reform and is 3.3 percent larger in the long run.

Under the FT, investment in the composite good sector increases by 11.4-44.6 percent in the year of reform, and then gradually falls to a level that is 16.9 percent higher than in the initial steady state. Investment in the rental housing sector increases by 18.9-52.8 percent initially and by 15.0 percent in the long-run steady state. Investment in owner-occupied housing decreases by 8.4-100.5 percent in the year of reform, and increases by 2.3 percent in the long run steady state. These changes in investment imply a short run increase in the savings rate of roughly 6.2-12.3 percent and a long run increase in the savings rate of 8.4 percent. As expected, investment responses are more modest under the AT given its less generous treatment of capital income. Investment in the composite good sector increases by 7.5-27.8 percent in the year of reform, and then gradually falls to a level that is 10.9 percent higher than in the initial steady state. Investment in the rental housing sector increases by 13.5-33.9 percent in the year of reform and by 9.9 percent in the long-run steady state. Investment in owner-occupied housing decreases by 3.6-56.8 percent in the year of reform, and increases by 2.3 percent in the long run steady state. These changes in investment imply a short run increase in the savings rate of roughly 3.8-9.1 percent and a long run increase of 4.9 percent.

In general, the increases in investment in the composite good and rental housing sectors and the initial decline in investment in owner-occupied housing occur for two reasons. First, eliminating or reducing the tax on the normal rate of return to investment and the gradual decline in interest rates reduce the cost of capital and thus increase the optimal level of investment in the composite good and rental housing sectors relative to the initial steady state. Second, the reduction of the relative tax advantage of owner-occupied

housing at the individual level due to the elimination of deductions for home mortgage interest and property taxes reduces demand for such housing and thus encourages a reallocation of capital from the owner-occupied housing sector to the composite good and rental housing sectors, and thus also increases investment in these sectors. The increase in investment is larger under the FT relative to the AT because the reductions in effective tax rates on capital investment in the composite and rental housing sectors are larger under the FT.

One of the economic benefits of fundamental tax reform is a more efficient allocation of capital across the housing and composite good sectors, but this naturally comes only with a reduction in investment in owner-occupied housing during a transition period following reform. Under the FT, the capital stocks in the composite good and rental housing sectors increase in every year after reform in relation to the initial steady state, and are 16.9 and 15.0 percent larger, respectively, in the long run steady state. The responses are smaller under the AT, with the capital stocks in the composite good and rental housing sectors 10.9 and 9.9 percent larger, respectively, in the long run steady state. By comparison, in the owner-occupied housing sector, the stock of capital declines as capital is reallocated to the rental housing and composite good sectors. This reallocation is larger under the FT than the AT since under the latter (as modeled in this paper) a tax preference for owner-occupied housing is retained (mortgage interest payments and property taxes are assumed to be deductible at the 15 percent rate). In the long run, the enactment of the FT reduces the share of the capital stock in the owner-occupied housing sector from 40.4 to 37.3 percent, while the share of composite good capital increases from 48.3 to 51.0 percent and the share of rental housing capital increases modestly from 11.3 to 11.7 percent. By comparison, under the AT, the share of the capital stock in the owner-occupied housing sector falls from 40.4 to 38.5 percent, while the share of composite good capital increases from 48.3 to 49.9 percent and the share of rental housing capital increases modestly from 11.3 to 11.5 percent.

4.2 Effects on Business Equity Prices and Housing Values

As noted previously, the implementation of a consumption tax raises some complex transitional issues, with the potential of large windfall losses for the owners of business equity and owner-occupied housing. In this section, we compare the effects of the FT and AT plans on asset values within the context of our model.

Table 3 shows the effects of implementing the FT if there are no transition rules. In the case with no (high) adjustment costs, the average value of equity in the composite good production sector (average Q) decreases by 16.5 (0.1) percent initially, while the average value of equity in the rental housing sector (where remaining basis is relatively large) decreases by 29.9 (19.9) percent. The effects of reform on the value of equity in the owner-occupied sector are much more modest, where home equity values initially fall by 2.9 (5.1) percent which, with a debt-asset ratio of 0.35, is equivalent to a decline in total value of 1.9 (2.7) percent; equity values return to their initial levels by the fourth year after the reform.³⁰

Table 4 shows the effects of implementing the AT if there are no transition rules. In the case with no (high) adjustment costs, because the tax treatment of the income generated by new capital assets is less generous than under the FT, the declines in asset prices are more modest. The average value of equity in the composite good sector decreases by 12.0 (1.5) percent in the year of reform, while the average value of equity in the rental housing sector decreases by 22.5 (15.4) percent. Home equity values initially fall by 1.4 (2.1) percent which, with a debt-asset ratio of 0.35, implies a 0.9 (1.4) percent decline in the total value of owner-occupied housing; equity values again return to their initial levels by the fourth year after the reform.

³⁰ In the long run, the value of average Q in the owner-occupied sector returns to its initial steady state value since there are no business-level taxes in this sector. By comparison, the value of average Q in the other two sectors, which is adjusted for business tax factors, declines in the long run as a result of the more generous treatment of investment in these sectors under the flat tax.

Table 3
Percent Change in Selected Variables, Flat Tax

Years After Enactment	With Adjustment Costs Close to Zero						With Adjustment Costs Equal to 10					
	0	2	4	10	20	100	0	2	4	10	20	100
After-Tax Return	0.3	1.6	1.3	0.6	0.3	0.2	0.1	1.0	0.8	0.4	0.1	0.1
Before-Tax Return	-1.2	0.2	-0.2	-0.9	-1.2	-1.3	-1.4	-0.5	-0.7	-1.1	-1.4	-1.4
Before-Tax Wage	-0.5	1.7	2.6	3.5	4.1	4.2	-0.6	0.8	1.4	2.1	2.5	2.5
Price - RH Service	-1.4	-4.1	-6.0	-9.1	-11.2	-11.7	-0.2	-1.9	-3.3	-5.7	-7.3	-7.4
Price - OH Service	-1.4	7.7	9.2	5.1	2.1	1.3	-0.1	5.1	5.8	3.1	1.1	1.0
Flat Tax	22.3	21.8	21.1	20.5	20.2	20.1	19.7	19.5	19.1	18.8	18.6	18.6
Payroll Tax	7.1	6.9	6.8	6.8	6.8	6.7	7.0	6.9	6.9	6.9	6.8	6.8
Labor Supply	1.8	2.0	2.1	2.0	1.8	1.8	2.2	2.3	2.3	2.1	2.0	2.1
Investment NH	44.6	27.6	19.8	17.7	17.1	16.9	27.8	17.4	13.1	11.8	11.3	11.0
Investment RH	52.8	44.1	31.8	23.9	17.5	15.0	33.9	28.8	21.9	16.8	11.9	9.9
Investment OH	-100.5	-19.6	11.3	11.7	5.0	2.3	-56.8	-8.9	8.7	9.1	4.4	2.3
NH Capital	0.0	8.0	11.4	14.6	16.5	16.9	0.0	5.0	7.2	9.6	10.9	11.0
RH Capital	0.0	4.0	6.7	11.0	14.1	15.0	0.0	2.6	4.4	7.4	9.6	9.9
OH Capital	0.0	-5.8	-6.1	-1.9	1.4	2.3	0.0	-3.2	-3.2	-0.4	1.9	2.3
Tobin's Q - NH	-16.5	-20.8	-20.4	-19.2	-18.8	-18.7	-12.0	-15.1	-15.0	-14.5	-14.3	-14.3
Tobin's Q - RH	-29.9	-31.4	-30.4	-29.4	-29.0	-28.9	-22.5	-23.8	-23.3	-22.8	-22.6	-22.6
Tobin's Q - OH	-2.9	-1.3	0.2	0.4	0.1	0.0	-1.4	-0.7	0.2	0.3	0.1	0.0
NH Firm Value	-16.5	-14.5	-11.3	-7.4	-5.4	-4.9	-12.0	-10.9	-8.9	-6.4	-5.0	-4.9
RH Firm Value	-29.9	-28.7	-25.8	-21.6	-19.0	-18.3	-22.5	-21.9	-20.0	-17.1	-15.2	-14.9
OH Firm Value	-2.9	-7.0	-5.9	-1.5	1.5	2.3	-1.4	-3.9	-3.1	-0.1	2.0	2.3
GDP	1.0	3.1	4.0	4.5	4.8	4.9	1.4	2.7	3.2	3.7	3.9	3.9
NH Output	1.4	3.4	4.3	4.8	5.1	5.2	1.6	2.9	3.4	3.9	4.1	4.1
RH Output	-1.4	-0.4	0.2	0.7	1.0	1.2	-0.2	0.5	0.8	1.1	1.4	1.6
OH Output	-1.5	1.5	2.7	3.1	3.5	3.7	-0.1	1.8	2.4	2.8	3.0	3.3

Table 4
Percent Change in Selected Variables, Add-On Capital Income Tax

Years After Enactment	With Adjustment Costs Close to Zero						With Adjustment Costs Equal to 10					
	0	2	4	10	20	100	0	2	4	10	20	100
After-Tax Return	0.1	1.0	0.8	0.4	0.1	0.1	0.2	0.6	0.6	0.4	0.2	0.1
Before-Tax Return	-1.4	-0.5	-0.7	-1.1	-1.4	-1.4	-1.3	-0.9	-0.9	-1.1	-1.3	-1.4
Before-Tax Wage	-0.6	0.8	1.4	2.1	2.5	2.5	-0.6	-0.2	0.2	1.1	1.8	2.5
Price - RH Service	-0.2	-1.9	-3.3	-5.7	-7.3	-7.4	0.8	0.0	-0.8	-2.7	-4.8	-7.3
Price - OH Service	-0.1	5.1	5.8	3.1	1.1	1.0	1.0	1.7	2.2	2.7	2.6	1.0
Flat Tax	19.7	19.5	19.1	18.8	18.6	18.6	19.1	19.2	19.1	18.9	18.7	18.6
Payroll Tax	7.0	6.9	6.9	6.9	6.8	6.8	7.0	7.0	7.0	6.9	6.9	6.8
Labor Supply	2.2	2.3	2.3	2.1	2.0	2.1	2.2	2.1	2.1	2.1	2.0	2.1
Investment NH	27.8	17.4	13.1	11.8	11.3	11.0	7.5	8.0	8.4	9.4	10.1	10.9
Investment RH	33.9	28.8	21.9	16.8	11.9	9.9	13.5	13.4	13.3	12.9	11.5	9.9
Investment OH	-56.8	-8.9	8.7	9.1	4.4	2.3	-3.6	-2.5	-1.3	1.2	2.3	2.3
NH Capital	0.0	5.0	7.2	9.6	10.9	11.0	0.0	1.5	2.8	5.8	8.5	10.9
RH Capital	0.0	2.6	4.4	7.4	9.6	9.9	0.0	1.0	1.9	4.3	6.9	9.9
OH Capital	0.0	-3.2	-3.2	-0.4	1.9	2.3	0.0	-0.3	-0.4	-0.3	0.4	2.2
Tobin's Q - NH	-12.0	-15.1	-15.0	-14.5	-14.3	-14.3	-1.5	-4.4	-6.0	-9.1	-12.1	-14.3
Tobin's Q - RH	-22.5	-23.8	-23.3	-22.8	-22.6	-22.6	-15.4	-16.9	-17.5	-18.7	-20.4	-22.6
Tobin's Q - OH	-1.4	-0.7	0.2	0.3	0.1	0.0	-2.1	-1.8	-0.9	0.7	1.2	0.0
NH Firm Value	-12.0	-10.9	-8.9	-6.4	-5.0	-4.9	-1.5	-2.9	-3.3	-3.9	-4.6	-4.9
RH Firm Value	-22.5	-21.9	-20.0	-17.1	-15.2	-14.9	-15.4	-16.1	-15.8	-15.2	-15.0	-14.9
OH Firm Value	-1.4	-3.9	-3.1	-0.1	2.0	2.3	-2.1	-2.1	-1.3	0.4	1.6	2.3
GDP	1.4	2.7	3.2	3.7	3.9	3.9	1.5	1.9	2.2	2.8	3.4	3.9
NH Output	1.6	2.9	3.4	3.9	4.1	4.1	1.6	2.0	2.3	3.0	3.6	4.1
RH Output	-0.2	0.5	0.8	1.1	1.4	1.6	0.8	1.0	1.2	1.4	1.6	1.6
OH Output	-0.1	1.8	2.4	2.8	3.0	3.3	1.0	1.4	1.8	2.4	3.0	3.3

The simulations show that the windfall losses in the composite good and rental housing sectors are moderated when adjustment costs are added, since the reallocation of capital to these sectors is slowed, allowing existing assets to earn above-normal returns during the transition. By comparison, adjustment costs – which are assumed to be symmetric across all sectors – slow down the reallocation of capital out of the owner-occupied housing sector, increasing windfall losses in that sector. This effect is magnified by the higher interest rates that occur during the transition in the presence of adjustment costs.

Thus, our results suggest that implementing the AT would decrease the total value of owner-occupied housing by only 0.9-1.4 percent initially, while declines in the values of rental housing are relatively large under all scenarios. This suggests that, even though most discussions of transitional issues and housing have focused on owner-occupied housing, the transitional problems are most severe – and the case for transition relief is strongest – for rental housing.

5. Conclusion

This paper examines the economic effects of implementing a stylized version of the Growth and Investment Tax plan recommended by the tax reform panel in the US to the effects of enacting a pure consumption tax such as the Hall and Rabushka Flat Tax using a dynamic overlapping generations CGE model.

Our results provide an estimate of the differences in macroeconomic effects and windfall gains and losses under the two plans. They suggest that, taking into account adjustment costs, the short run increase in GDP would be larger under the AT (1.5 percent) than under the FT (1.3 percent), reflecting a larger initial reduction in the after-tax wage and thus a larger short run labor supply response. In the long run, however, GDP increases by 3.9 percent under the AT relative to 4.9 percent under the FT, reflecting the less generous treatment of capital income under the AT and thus smaller long run increases in investment. One of the economic benefits of fundamental tax reform is a more efficient allocation of capital across the housing and composite good sectors. In the long run, the share of the capital stock in the owner-occupied housing sector falls from 40.4 to 38.5 percent under the AT, relative to 40.4 to 37.3 percent under the FT.

Many observers are unconvinced that a movement to a true consumption tax such as a FT is desirable, citing concerns about the transitional problems related to the tax-induced changes in asset values of such a reform. These windfall losses in the composite good and rental housing sectors are significantly moderated under an AT. For example, the average value of equity in the composite good (rental housing) sector falls by 1.5 (15.4) percent in the year of reform under the AT instead of by 10.4 (26.3) under the FT. This suggests that an add-on tax is likely to be politically more feasible, especially if one considers the distribution of welfare changes across income groups, which is the focus of ongoing research.

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