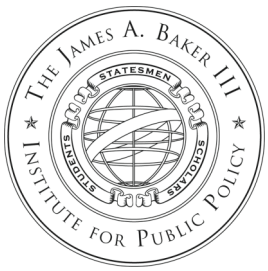


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# The Impact of H.R. 25 on Housing and the Homebuilding Industry

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**Abstract**

This report examines the macroeconomic and transitional effects of implementing a specific type of consumption tax reform—the national retail sales tax known as the FairTax, as specified in H.R. 25—with a focus on the effects of such a reform on the housing sector, including reform-induced reductions in the prices of existing housing. The analysis is conducted within the context of a dynamic overlapping generations computable general equilibrium model that includes a corporate sector that produces a nonresidential composite good as well as noncorporate rental housing and owner-occupied housing production sectors and allows for the costs of adjusting all capital stocks in response to the enactment of the reform.

## I. Introduction

In recent years there have been many proposals put forth for "fundamental" tax reform. These proposals follow two general approaches. One involves a sweeping overhaul of the existing corporate and individual income tax system along the lines of the Tax Reform Act of 1986 or the "Simplified Income Tax" proposed by the recent President's Advisory Panel on Federal Tax Reform (2005). For many individuals, however, such reforms are far from "fundamental" enough, as they would instead prefer to eliminate the existing income tax system entirely—to "rip the income tax system out by its roots" in the famous words of former Congressman and House Ways and Means Committee Chair Bill Archer (R-TX)—and replace it with a consumption-based tax system. However, even if one agrees with the latter approach, there are a multitude of options from which to choose. The most prominent are (1) the Flat Tax developed by Hall and Rabushka (1985) and championed by Rep. Richard Armey (R-TX) and presidential candidate Steve Forbes; (2) the multiple rate version of the Flat Tax known as the X-Tax developed by Bradford (1986, 2005) and discussed at length, but not formally recommended, by the President's Advisory Panel on Federal Tax Reform (2005); (3) the cash flow consumption tax developed by Aaron and Galper (1985) and loosely adopted in the USA (Unlimited Savings Allowance) Tax proposed by Senators Sam Nunn (D-GA) and Pete Domenici (R-NM) (Wiedenbaum, 1995); (4) the Value-Added Tax (VAT) used widely in Europe and elsewhere around the world and recommended for the United States in the proposal by Graetz (2002) as part of a system that would include an income tax that applied only to high-income individuals; and (5) a national retail sales tax, most prominently the proposal known as the FairTax, introduced as H.R. 25 on January 4, 2005, by Rep. John Linder (R-GA) and most recently reintroduced as H.R. 25: Fair Tax Act of 2007 on January 4, 2007, with sixty-seven co-sponsors.

This plethora of tax reform proposals has generated a huge academic and popular literature that compares the relative advantages and disadvantages of both the alternative approaches to fundamental tax reform and the various options for consumption-based taxation. We do not revisit these longstanding debates in this report.[1] Instead, we focus on a single proposal—the FairTax detailed in H.R. 25—and analyze its economic effects within the context of a dynamic

[1] For recent collections of articles on these issues, see Boskin (1996), Aaron and Gale (1996), Zodrow and Mieszkowski (2002), Aaron, Burman and Steuerle (2007), and Diamond and Zodrow (forthcoming).

overlapping generations computational general equilibrium model that we have developed and named the Tax Policy Advisers Model (the TPA Model). In addition, we focus on a topic that has sparked a great deal of interest and controversy: the short run and long run effects of enacting a consumption-based tax, in this case H.R. 25, on consumer housing demand, on the housing industry, and on housing values. Because the TPA Model includes separate owner-occupied housing and rental housing sectors within a dynamic computable general equilibrium model of the U.S. economy, and because it tracks housing asset values both in the long run and year by year during the transition to a new equilibrium after the enactment of a reform, it is especially well-suited to analyzing the effects of the implementation of H.R. 25 on this critical sector of the economy.

The report is organized as follows: in the following section, Section II, we describe the main features of H.R. 25, especially with respect to how it treats housing. Since much of the debate on this proposal has focused on what rate would be required for a real revenue neutral reform, we examine this issue in considerable detail. Section III discusses the existing literature regarding the effects on housing of implementing a consumption-based tax such as H.R. 25. In Section IV, we outline the structure of the TPA Model, identifying how it captures the effects that implementing H.R. 25 would have on housing. The calibration of the model and the results of simulating the enactment of this reform in the model are presented in Section V, with a focus on housing demand, the housing industry, and housing values. In addition, we perform several "off-model" calculations in order to provide some admittedly rough estimates of the effects of the enactment of H.R. 25 on various key housing sector variables. Section VI summarizes the results of our study and suggests several directions for future research.

Before proceeding, it will be useful to mention a few important caveats. Most importantly, it should be noted that, with one exception, we assume in the analysis that H.R. 25 is enacted as currently written. The exception (discussed further in Section II) is that we calculate the tax rate under the standard assumption that the real level of federal government services is held constant. As is now widely recognized, the calculation of the 23 percent FairTax rate in the H.R. 25 proposal effectively assumes a significant decline in real government expenditures. Although this can be demonstrated under many scenarios, the most obvious is under the assumption that the

Federal Reserve Board accommodates the enactment of a national retail sales tax by allowing consumer prices to rise by the full amount of the tax (while producer prices and thus wages remain unchanged). In this case, because H.R. 25 assumes that virtually all federal government services are subject to tax, it effectively increases the revenue required by the amount of the tax—but this increase in required revenues is not taken into account in the calculation of the 23 percent rate. Both opponents of the FairTax (e.g., Gale (2005)) and its proponents (e.g., Bachman, Houghton, Kotlikoff, Sanchez-Penalver, and Tuerck (2006), hereafter referred to as Kotlikoff et al.) now agree that under a properly constructed revenue-neutral national retail sales tax proposal, the tax rate should be independent of whether federal expenditures are taxed or not, as any revenues so gained are fully offset by the increased expenditures needed to achieve real revenue neutrality. Accordingly, our model representation of H.R. 25 similarly imposes the constraint of real revenue neutrality.[2]

Beyond this adjustment, however, we assume that H.R. 25 is enacted as written. This is, of course, a heroic assumption; even the storied Tax Reform Act of 1986 reflected many political compromises from the original reform proposal made in Treasury-I (U.S. Department of the Treasury, 1984), which in turn included numerous departures from a "pure" comprehensive income tax that was the general model for the proposal. Thus, the likelihood that the FairTax would pass as described in H.R. 25 is exceedingly slim. In particular, its provisions to tax virtually all private consumption (including health care, food, all rental housing, and new owner-occupied housing) would be highly controversial. Taxing all public consumption including that of state and local governments would be equally contentious, and would raise constitutional issues. It is also far from clear how effectively a relatively high-rate retail sales tax could be collected, and whether evasion by small retailers, typically viewed to be the weakest link in the tax collection chain, would become endemic (Murray, 1997).[3] All of these factors would imply a narrower tax base and thus higher rates than would arise under a pure version of the tax (Gale, 2005).

[2] Note that such treatment is also consistent with the description of the FairTax by Boortz and Linder (2005), who assert that the proposal is not designed to provide tax cuts.

[3] Note, however, that the likelihood that a national retail sales tax would be enforced effectively would be increased if it were to adopt some of the features of a value-added tax (Zodrow, 1999a).

Another important issue is the assumption about the baseline level of taxes, since the 2001 and 2003 tax cuts are scheduled to expire at the end of tax year 2010. Assuming the tax cuts are extended is equivalent to assuming a tax cut into the fiscal baseline, which also affects the distributional aspects of reform. In fact, this explains some of previous differences (about 2.4 percent) in various calculations of the revenue-neutral national sales tax rate. However, not extending the tax cuts ignores the fact that the current macro aggregates are mainly a product of current tax rates and expectations about future tax rates. Neither assuming the tax cuts are permanently extended or that the tax cuts are allowed to expire is necessarily the correct assumption because increases in future tax rates would affect both the income tax equilibrium as well as the calculation of the national sales tax rate. Furthermore, the current tax rates imply that tax revenues are 18.3 percent of gross domestic product (GDP), which is equivalent to the average over the last thirty years. Given this, our calculations are consistent with the assumption that the 2001 and 2003 tax rates are permanently extended. If this is not the case, then the revenue-neutral future sales tax rates would have to be higher than predicted under this assumption.

Finally, the distributional implications of moving to a flat rate tax are often perceived to be extremely troublesome, especially if the tax included elimination of the Earned Income Tax Credit and the Child and Dependent Care Tax Credit, although these concerns are tempered somewhat if one takes a long-term or even lifetime view of tax incidence rather than focusing on the regressivity of a consumption-based tax during any single year (Fullerton and Rogers, 1993). Indeed, concerns about the reduction in tax progressivity associated with implementation of the FairTax were a primary reason the proposal was not given serious consideration by the president's tax reform panel. Note, however, that the regressivity of the sales tax would be mitigated at the low end of the income distribution by the prebate and somewhat at the high end, at least during a long transition, to the extent that the tax applied to capital existing at the time of enactment (as capital assets are drawn down to finance newly taxable consumption).

All these concerns suggest that passage of the national retail sales tax envisioned in H.R. 25 is unlikely, as is any truly fundamental reform of the U.S. tax structure. Nevertheless, the effects of the "pure" proposal are still of considerable interest, at least as an initial benchmark. We focus

primarily on that case, although we do comment briefly on some of the implications of deviations from the model tax.

## II. Overview of H.R. 25, Including Its Treatment of Housing

In this section, we provide an overview of the national retail sales tax envisioned in H.R. 25, including its treatment of both new and old rental and owner-occupied housing. We then describe how we have resolved the various issues that have arisen in the debate regarding the rate required for revenue neutrality under H.R. 25.

Before proceeding, we briefly note the distinction between tax-inclusive and tax-exclusive tax rates that has also played a prominent role in discussions of the FairTax. Income tax rates are commonly expressed in tax-inclusive terms—that is, the base includes the tax, so that the after-tax income received by the individual is $(1-t)$ of the tax-inclusive income tax base, where $t$ is the tax-inclusive tax rate. By comparison, sales taxes are typically expressed in tax-exclusive terms—that is, the base does not include the tax, and the consumer pays an after-tax price of $(1+\tau)$ times the tax-exclusive sales tax base, where $\tau$ is the tax-exclusive tax rate. The tax-inclusive tax rate is thus always less than the tax rate calculated on a tax-exclusive basis; specifically, $t = \tau/(1+\tau) < \tau$ and, equivalently, $\tau = t/(1-t) > t$. Proponents of national retail sales taxes have diverged from the common practice by quoting the tax rates in their proposals in tax-inclusive terms, arguing that such an approach is appropriate in order to draw accurate comparisons with the rates under the income tax and avoid misperceptions about how high rates under the sales tax would be. Indeed, the difference can be considerable, especially for relatively high rates. For example, a tax-inclusive rate of $t = 33.3$ percent corresponds to a tax-exclusive rate of $\tau = 50$ percent. To avoid any confusion, we always specify whether we are referring to tax-inclusive or tax-exclusive tax rates, utilizing the notation introduced above.

### A. General Provisions

H.R. 25 would repeal the federal corporate and individual income taxes (including their alternative minimum tax versions), payroll taxes for Social Security and Medicare, and estate

and gift taxes and replace them with a flat rate tax on most forms of consumption, coupled with a universal "prebate" designed to eliminate the burden of the new tax for those living at or below the poverty level of income.

The tax base is a broad definition of consumption (although certain consumption items are excluded) in order to minimize the required tax rate and to apply a uniform rate to most forms of consumption to minimize inefficient distortions of consumption decisions. In general, consumers would pay the national retail sales tax when they purchase consumption goods and services, while sales to businesses would not be taxed since they do not represent final consumption.[4] In particular, the tax would apply to all expenditures on health care (including health insurance premiums, with a credit for tax paid on services purchased with insurance proceeds to avoid double taxation), housing rents and food (to the extent that taxes on such expenditures are not offset by the tax "prebate" discussed below). However, the tax would not apply to certain expenditures related to education and job training on the grounds that such expenditures represent an investment in human capital and, following the logic underlying the treatment of investment under a consumption-based tax, should be untaxed. In addition, food produced and consumed at home is exempt on administrative grounds, and an administrative credit of 0.25 percent of revenues is provided to the states to reimburse their costs of collecting the tax.

H.R. 25 also applies sales tax to new housing and other consumer durables. However, rather than attempting to determine the value of the consumption services generated by these goods and including them in the tax base on a current basis, H.R. 25 taxes new housing, improvements to existing housing, and other consumer durables on a "prepaid" basis, as consumers would pay tax on the full price of these goods at the time of purchase. Because the purchase price of new housing or consumer durables should in principle reflect the present value of the future consumption services they generate, such an approach should be a reasonable proxy for the direct taxation of such services. It should, however, be noted that such treatment implies a deviation in an accounting sense from a true consumption tax base in that current investment in

[4] Of course, delineating between consumer and business purchases has been difficult under the state sales taxes. Recent estimates suggest that only approximately 60 percent of the state sales tax base is actual personal consumption (Ring, 1999). The FairTax would allow rebates of sales tax inappropriately collected on business-to-business sales.

owner-occupied housing (but not in rental housing, which is appropriately treated as investment under the FairTax) is included in the tax base, while future imputed rents or consumption services attributable to that investment in owner-occupied housing will not be taxed.

Moreover, in an important deviation from a true consumption tax base, housing services from existing owner-occupied housing are exempt from tax; that is, no attempt is made to impute the value of the rental services generated by existing owner-occupied housing and include it in the tax base, and sales of existing owner-occupied homes (other than those to businesses) have no effect on the tax base. The rationale is that existing housing was purchased out of after-income tax dollars, and thus should not be taxed under the new system. However, such logic would apply to any consumption financed from capital existing at the time of enactment. Indeed, a common characterization of a consumption tax is that it is partly a tax on existing capital, a characterization that applies generally to H.R. 25, but not to the housing capital existing at the time of enactment of reform. Another way of thinking about this treatment is that it implies that existing housing is spared the potential transitional "hit" on existing capital that occurs for other forms of capital. (In addition, another exception is inventories, as H.R. 25 provides for a two-year credit for sales from inventories existing at the time of enactment of reform, to be taken at the time the inventory is sold. The credit is equal to the product of the book value for federal income tax purposes of the inventory as of the time of enactment times and the sales tax rate.)

The base of the FairTax also includes the consumption of services provided by both federal and subnational state and local governments. Such treatment avoids creating a tax bias for consumption of untaxed public services, relative to taxed private services. In cases where explicit prices or fees are charged, such fees or prices are included in the tax base. However, since prices for public services are generally not available, H.R. 25 adopts a proxy approach in such cases. Specifically, the value of government output is assumed to equal the value of inputs, which are assumed to either produce current consumption goods, or reflect investment in capital goods that will generate future consumption services and are thus taxed on a "prepaid" basis, analogous to the treatment of new housing and consumer durables. The net result is that all federal and state and local government inputs, including wages and salaries, intermediate goods, and the purchase of investment goods, are included in the tax base—with the exception of inputs that are deemed

to be associated with providing education services and are exempt from tax on the grounds that they represent an investment in human capital. In order to avoid cascading or multiple layers of taxation, state and local taxes on consumer goods are not included in the tax base.[5]

Financial intermediation services would also be taxed as consumption services under H.R. 25. Explicit fees for financial intermediation, such as brokerage fees, mutual fund management, sales and exit fees, loan origination and processing fees, safe deposit fees, etc., would be taxed directly. However, the base also includes implicit financial intermediation services for consumer loans and savings, including demand deposits (where services, such as checking accounts, debit cards, and ATMs, are provided for "free" but deposits earn little or no interest). For example, for consumer loans from financial institutions, including home mortgages and credit card debt, financial intermediation services would be defined as the principal balance times the difference between the interest rate on the loan and the interest rate on a comparable Treasury bond. For consumer savings at financial institutions, including demand deposits and other checkable deposits, savings deposits, certificates of deposit, and money market funds, financial intermediation services would be defined as the amount of savings times the difference between the interest rate on a comparable Treasury bond and the interest rate on the deposit.

H.R. 25 in principle applies to the services provided by the nonprofit sector. However, in practice, coverage is only partial, as nonlabor inputs purchased by the nonprofit sector are taxed, but no adjustment is made for the wages and salaries of the employees of nonprofit institutions. Thus, services provided by nonprofit institutions are only partially taxed.

H.R. 25 is a destination-based tax. Thus, expenditures in the United States by nonresidents would be taxed, but the expenses of U.S. citizens traveling abroad would not be taxed, unless they purchased goods that were carried back into the country.

[5] Note that because state and local services are included in the consumption tax base, real state and local expenditures will decline unless the state and local governments increase their tax rates by enough to pay the federal tax. However, as shown by Kotlikoff, et al. (2005), if the FairTax reform is real revenue neutral at the federal level, the total amount of gross income available to state and local governments and their citizens will be unchanged, so that such tax increases would still leave state and local residents with enough after-tax income to buy the same package of consumption goods and services and state and local services that they did before the enactment of the

In order to mitigate concerns about regressivity at the low end of the income distribution, H.R. 25 provides for a tax rebate that would cover the costs of the tax for households below the poverty level of income, known as a "prebate," because it would arrive at the beginning of each month. The amount of the prebate equals the product of the tax-inclusive tax rate and the amount of the poverty level of income (adjusted for the increase in the price level) for the household, adjusted to eliminate marriage penalties (a lower prebate when two individuals get married).

### B. Calculation of the FairTax Rate Formula

Much of the debate regarding the FairTax has focused on the rate required for revenue neutrality. This concern is certainly well-placed; the tax rate under a consumption tax reform is a key determinant of the efficiency gains attainable under such a reform, the magnitude of the remaining distortions of labor supply, and the general political appeal and political viability of the plan (which becomes especially problematical if rates start climbing and are expressed in tax-exclusive terms). In this section, we examine this debate, focusing on describing and reconciling two recent careful and comprehensive estimates of the rate required under the FairTax by Gale (2005) and Kotlikoff et al. (2006), and we explain how we have resolved the various issues raised in this debate in our own simulations. Note, however, that following these two authors, the rate calculation is a static one; in our computable general equilibrium simulations, the dynamic effects of implementing the FairTax are taken into account, and these lower the tax rate required to achieve real revenue neutrality.

As noted previously, there is now general agreement that the calculation of the 23 percent tax inclusive rate specified in H.R. 25 does not achieve its stated goal of real revenue neutrality and instead effectively assumes a significant decline in real government expenditures, as revenues obtained from the sales taxation of federal government goods and services are not offset by the increased revenue requirements that would be needed to purchase those goods and services. Both opponents of the FairTax (e.g., Gale (2005)) and its proponents (e.g., Kotlikoff et al.) now agree that under a properly constructed, revenue-neutral national retail sales tax proposal, the tax rate should be independent of whether federal expenditures are taxed or not, as any revenues so

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reform.

gained would be fully offset by the increased expenditures needed to achieve real revenue neutrality. We follow this convention in our analysis, as our model representation of H.R. 25 similarly imposes the constraint of real revenue neutrality.

Nevertheless, even when the revenue neutrality constraint is appropriately specified, differences on the required FairTax rate remain. For example, Kotlikoff et al. (2006) estimated that in 2007 the revenue-neutral, tax-inclusive FairTax rate is 23.8 percent, only slightly higher than the original 23 percent figure, while Gale (2005) estimates that the revenue-neutral tax-inclusive rate over the period from 2006 to 2015 would be 30.6 percent, a difference of 6.8 percentage points. Part of this difference, however, is due to the fact that Gale considers a ten-year period (extrapolated from 2003 data) while Kotlikoff et al. consider a single year. If the comparison were drawn in the year chosen by Kotlikoff (2007), the difference would be narrower, as Gale estimates the required revenue neutral tax-inclusive rate to be 28.2 percent, which narrows the differential to 4.4 percentage points. In the following discussion, we attempt to reconcile this remaining difference, following an approach that will give us the revenue-neutral rate that we need for our analysis—an estimate for 2006, the year of our benchmark equilibrium in the model.

We begin by constructing a simple model of the calculation of a real revenue neutral tax-inclusive rate under the FairTax, following both Gale and Kotlikoff et al. (whose basic approaches are similar, although we use the notation of the former). The current federal government budget constraint, expressed in nominal terms before the enactment of H.R. 25, requires that total receipts including borrowing equal total outlays, or

(1) $R_S + R_O + R_I + B = G_S + G_O + G_I + T,$ where

$R_S$ is current nominal federal tax revenues that would be replaced by the FairTax, including personal and corporate income taxes, payroll taxes, and estate and gift taxes,

$R_O$ is current federal revenues that would not be replaced by the FairTax, including excise taxes and customs duties,

$R_I$ is current revenue from interest income received by the government,

$B$ is current nominal federal borrowing that finances the deficit,

$G_S$ is current nominal federal expenditures that would be subject to the FairTax,

$G_O$ is current nominal federal expenditures that would not be subject to the FairTax,

$G_I$ is current nominal federal expenditures on interest payments to the holders of government debt

$T$ is current nominal federal expenditures on transfer payments.

Gale also defines the primary deficit—the deficit after netting out interest payments on old debt—as total borrowing less net interest payments by the government, or

(2) $D = B - (G_I - R_I)$

so that (1) can equivalently be written as

(3) $R_S + R_O + D = G_S + G_O + T,$

or

(4) $R_S + R_O + B = G_S + (G_O + T) + (G_I - R_I).$

Both Gale and Kotlikoff et al. demonstrate that, neglecting any revenue effects of reform-induced wealth effects on the holders of government bonds, the FairTax tax rate is independent of the extent to which the tax is shifted forward to consumers. Accordingly, we make the most common assumption—that the Federal Reserve Board accommodates the enactment of the tax such that there is a one-time increase in the price level equal to the amount of the tax, that is, 100 percent forward shifting with producer prices remaining constant. Recall that H.R. 25 includes a universal (that is, not means-tested) "prebate," designed to refund tax on a monthly basis (at the beginning of the month) on the poverty level of income for families of different sizes, with adjustments to eliminate marriage penalties. The total amount of the poverty level tax base for all households, expressed in current dollars, is denoted as $X$.

In addition, we denote current total private consumption that would be subject to tax as $C_P$ and current nominal expenditures on state and local government consumption and investment expenditures that would be subject to tax as $C_{SL}$.

Given that all prices are assumed to increase by the tax-exclusive tax rate $\tau$, the government's budget constraint after the enactment of H.R. 25 implies that the sum of (1) revenues under the sales tax, plus (2) revenues not replaced by the sales tax (which are assumed to increase with the price level), plus (3) the primary deficit (which is also increased by the amount of the tax so that its real purchasing power remains unchanged) must equal the sum of (1) government purchases subject to the sales tax, plus (2) government purchases not subject to the sales tax (note that this includes net interest payments, which do not increase in nominal terms with the enactment of the sales tax), plus (3) the cost of providing the prebate, or

$$(4) \qquad \tau(C_P + C_{SL} + G_S) + R_O(1+\tau) + [B - (G_I - R_I)](1+\tau) = G_S(1+\tau) + G_O + T(1+\tau) + X\tau.$$

Note that the cost of providing the rebate is $X\tau$ —that is, the product of the original prebate base and the tax-exclusive tax rate. This would cover the cost of the additional amount consumers would have to pay to purchase the poverty level of income under the new tax regime—that is, the total payment would be $(1+\tau)X$. In terms of the tax-inclusive tax rate *t*, consumers would receive $tX(1+\tau)$, that is, the product of the tax-inclusive rate and the nominal cost of the poverty level of income. Since $t = \tau/(1+\tau)$, the amounts paid under the prebate plan are equivalent.

Solving for the tax-exclusive tax rate $\tau$ yields

$$\tau[C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X] = G_S + G_O + T - R_O - B + (G_I - R_I)$$

$$(5) \qquad \tau = \frac{G_S + G_O + T - R_O - B + (G_I - R_I)}{C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X}$$

Since (3) indicates that $R_S + R_O + D = G_S + G_O + T$, this can be simplified to

$$(6) \qquad \tau = \frac{R_S}{C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X}.$$

To convert this to a tax-inclusive tax rate $t = \tau/(1+\tau)$,

$$t = \frac{R_S}{C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X} \frac{C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X}{R_S + C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X}$$

$$t = \frac{R_S}{R_S + C_P + C_{SL} + R_O + B - (G_I - R_I) - T - X}$$

$$(7) \qquad t = \frac{R_S}{C_P + C_{SL} + G_S + G_O - X}.$$

Note that the tax-exclusive rate can then also be obtained from $\tau = t / (1 - t)$.

### C. Application of the FairTax Rate Formula

Both Gale (2005) and Kotlikoff et al. (2006) use formulas similar to (7) in calculating the FairTax rate, constructing similar tables that detail their calculations of the tax base and the implied real revenue neutral tax rate. We follow and extend their basic approaches in Table 1, which shows the various components of the tax base under H.R. 25, the items on which there is agreement among both authors (Both Bases), the items for which the Kotlikoff et al. treatment (K-Base) differs from the Gale treatment (G-Base), and our resolution of the issue (DZ-Base). All figures are based on 2006 data, unless otherwise noted, and generally draw on data presented in the National Income and Product Accounts (NIPA) for 2006. Note that this assumption alone—that is, choosing a common year for which data are readily available (and thus need not be projected)—narrows the difference between the Gale and Kotlikoff et al. estimates. Specifically, using the Kotlikoff et al. approach to calculating the real revenue-neutral FairTax rate applied to 2006 data results in a tax-exclusive rate of 26.1 percent, while using the Gale approach results in a tax-exclusive rate of 28.9 percent. Thus, the difference between the two approaches when a common year is used for the calculation is only 2.8 percentage points, a result that seems reasonable, given the basic similarities between the two approaches. The details of our analysis into the remaining differences between the two approaches, as well as our resolution of these differences for purposes of our model simulations, are as follows.

*Revenues to be Replaced* ($R_S$)

There is relatively little disagreement on the total revenues to be replaced, as it is clear that H.R. 25 would replace personal and corporate income taxes, payroll taxes (social insurance and retirement receipts), and estate and gift taxes. However, both Gale and Kotlikoff et al. make several adjustments to total revenues to be replaced. Gale deletes from revenues to be replaced the small amount of corporate income tax revenue ($29.1 billion) raised from Federal Reserve banks, presumably on the grounds that such funds do not represent net revenues; we make this

adjustment as well. Kotlikoff et al. assume elimination of the Earned Income Credit and the refundable Child and Dependent Care Credit, which would reduce the revenue requirement by roughly $48.9 billion, while Gale treats these items as expenditure programs that should continue to be funded. Although both positions are tenable, we err on the side of making a conservative estimate of the real revenue-neutral sales tax rate and assume that these extremely popular programs would be maintained even if the income tax were eliminated. Finally, Kotlikoff et al. make roughly offsetting adjustments for the fees to be paid to the states for collecting revenues (0.25% of revenues, other than that collected from the public sector) and assumed savings in IRS administrative costs, while Gale simply ignores both factors. Given the minor revenue implications of both sets of assumptions, we do not attempt to resolve the difficult issue of how administrative costs would change with implementation of H.R. 25 (for an extended discussion, see Murray (1997)), and simply ignore these factors. Thus, total revenues to be replaced ($R_S$) fall in the narrow range of $2,304.6–2,326.6 billion, and our analysis assumes that $R_S = \$2,326.6$ billion.

*Private Consumption Tax Base* ($C_P$)

In both cases, the calculation of the private consumption tax base begins with total personal consumption expenditures (PCE) of $9,224.5 billion. However, as described above, numerous modifications must be made to PCE to arrive at the FairTax private consumption base, and Gale and Kotlikoff et al. differ in some of the details of these modifications. Note that some of these adjustments reflect removal of personal consumption items from the tax base (e.g., imputed rent on existing owner-occupied housing), but other adjustments add items not included in PCE (e.g., certain investment expenditures as a proxy for the future consumption services generated by the investment and an estimate of financial intermediation services) and government consumption expenditures. Thus, the tax base under H.R. 25 could in principle be larger or smaller than PCE (although it is always less than GDP).

*Investment in Residential Structures*

New investment in residential structures (including mobile homes) as well as all home improvements would be taxed under H.R. 25, as a means of capturing at the time of initial sale the present value of all future consumption of the associated housing services. Accordingly, both

Gale and Kotlikoff et al. add purchases of new homes and other residential structures and home improvements to the tax base. However, Kotlikoff et al. make three adjustments to the figures for gross new residential investment: (1) they do not include investment in dormitories ($2.1 billion in 2006), presumably on the grounds that such expenditures represent educational expenditures; (2) they do not include net purchases of new structures because they are not included in the H.R. 25 tax base (–$3.4 billion in 2006); and (3) they make an adjustment to new investment in residential structures to reflect the fact that some of this investment is for rental property that would not be taxed under the NRST, an adjustment that we estimate reduces the tax base in 2006 by 20.6 percent (20.6 percent of NIPA Table 5.4.B, line 36 or $96.6 billion). We do not make the first adjustment on the grounds that H.R. 25 explicitly excludes expenditures for room and board from educational expenditures, but we do make the second and third adjustments. In addition, all three calculations (1) include brokers' commissions on housing in the tax base on the grounds that they reflect consumption services; (2) deduct imputed rent on existing homes because returns to the existing housing capital stock are not subject to tax under the FairTax; and (3) deduct imputed rent on farm dwellings as uncollectible.

*Education Expenditures*

Education expenditures would be deductible under H.R. 25 on the grounds that they represent investment in human capital rather than consumption expenditures. Accordingly, both Gale and Kotlikoff et al., reduce the tax base by their estimates of education expenditures, which differ by only one item—their treatment of NIPA Table 2.4.5, line 97, which reflects "Other Education and Research" expenditures. This item consists "of (1) fees paid to business schools and computer and management training, technical and trade schools, other schools and instruction, and educational support services; and (2) current expenditures (including consumption of fixed capital) by nonprofit research organizations and by grantmaking foundations for education and research." It would seem that (1) would be fully deductible as education expenditures, while (2) is less clear since it reflects primarily research expenditures; Gale fully deducts all these expenditures, while Kotlikoff et al., deduct only half. Although H.R. 25 does not explicitly describe how research expenditures by educational institutions and other nonprofit institutions would be treated, it does in general provide for full deductibility of research and experimentation expenses in addition to full deductibility of educational expenses. Accordingly, we assume that

full deductibility would extend to research expenses by educational and nonprofit institutions. In 2006, this adjustment removes an additional $29.5 billion from the tax base under H.R. 25.

*Financial Intermediation*

Financial intermediation services would be taxed as consumption services under H.R. 25. For consumer loans from financial institutions, including home mortgages and credit card debt, financial intermediation services are defined as the principal balance times the difference between the interest rate on the loan and the interest rate on a comparable Treasury bond. For consumer savings at financial institutions, including demand deposits and other checkable accounts, savings deposits, CDs and money market funds, financial intermediation services are defined as the amount of savings times the difference between the interest rate on a comparable Treasury bond and the interest rate on the deposit. Both Gale and Kotlikoff et al. include similarly calculated estimates of financial intermediation services on home mortgages, consumer credit card debt and loans taken out by nonprofit institutions.

However, perhaps because the amounts involved are likely to be small, neither attempts to estimate the value of financial intermediation services on consumer saving, including demand deposits and other checking accounts, CDs and money market funds. Accordingly, we add to the sales tax base an estimate of financial intermediation on consumer savings by assuming that the interest rate on demand deposits and other checkable deposits is zero, and that the interest rate on savings deposits, CDs and money market funds approximates (or exceeds) the relevant Treasury interest rate, so that the tax on financial intermediation can be ignored for these two instruments. With average demand deposits and other checkable deposits of $494.3 billion in 2006,[6] and an interest rate on three-month Treasury bills of 4.73 percent in 2006,[7] this calculation adds $23.4 billion to the estimate of financial intermediation services in the DZ base. In the simulation model, financial intermediation services are simply added to personal consumption expenditures.

*Foreign Travel by U.S. Citizens*

The sales tax envisioned by H.R. 25 would be assessed on a destination basis. As a result,

[6] This figure represents an average of the twelve monthly total demand deposits in 2006 provided in *Economic Report of the President*, 2007, Table B-70.
[7] *Economic Report of the President*, 2007, Table B-73.

consumption abroad by U.S. citizens, including foreign travel, would not be taxed (although consumption in the United States by foreign citizens would be taxed). Accordingly, both Gale and Kotlikoff et al. reduce the sales tax base by their estimates of consumption abroad by U.S. citizens, which differ by only one item—Kotlikoff et al. only deduct 50 percent of foreign travel by U.S. residents (NIPA Table 2.5.5, line 110, "foreign travel by U.S. residents"). Because this adjustment is not explained, we have, for purposes of this static sales tax base calculation, decided to follow Gale and deduct all such expenses. In 2006, this adjustment removes a total of $108.7 billion from the NRST base, implying that the DZ tax base is $54.3 billion smaller than the base calculated by Kotlikoff et al. Note, however, that our CGE simulation model assumes a closed economy and thus does not consider these items; because the three adjustments virtually cancel (a net effect of -$6.8 billion), they have little net impact in any case.

*State and Local Sales Taxes*

To avoid double taxation, the national retail sales tax described under H.R. 25 would not be imposed in addition to existing state and local sales taxes, and both Gale and Kotlikoff et al. reduce the personal consumption expenditures component of the tax base (which includes such indirect taxes) to reflect such taxes. However, noting that roughly 40 percent of the state and local sales tax bases in practice consists of business purchases (which should in principle be tax exempt), Kotlikoff et al. deduct only 60 percent of state and local sales taxes from the sales tax base; Gale makes no such adjustment. The Kotlikoff et al. adjustment seems appropriate, as only state and local sales taxes on final consumer purchases will not be included in the tax base under H.R. 25; state and local sales taxes on business purchases will be imbedded in the consumer price but not treated as sales taxes at the time of purchase by the consumer. (Note that this implies that there will be some double taxation under H.R. 25, unless state and local government drastically reform their tax systems to eliminate undesirable sales taxation of business inputs, as often recommended by state sales tax experts).[8] In 2006, this adjustment implies that the sales tax base is reduced by $249.2 billion rather than by $415.4 billion, increasing the DZ base by $166.2 billion.

[8] See Zodrow (1999) for a discussion.

*Consumption by Nonprofit Institutions*

The tax base under H.R. 25 in principle includes consumption by nonprofit institutions, other than that associated with educational expenditures. Nonprofit consumption expenditures, including capital consumption allowances, are included in personal consumption expenditures in the NIPA, and are defined as nonprofit operating expenditures, including wages and salaries, net of sales of goods and services to the public and net of transfers made by the nonprofit. However, for reasons that are unclear, H.R. 25 does not include nonprofit wages and salaries in the tax base. Accordingly, Kotlikoff et al. make two adjustments that virtually cancel (-$9.4 billion), reducing the tax base to reflect the deduction of wages and salaries for nonprofits in the "religious and welfare" category, while adding investment expenditures by nonprofits (net of capital consumption allowances to avoid double counting). We follow Gale in ignoring this minor adjustment in our base calculation.

*Food Produced and Consumed on Farms*

Both Gale and Kotlikoff et al. reduce the size of the FairTax base by the amount of food produced and consumed on farms, on the grounds that tax on these items is uncollectible, and we follow that approach as well.

*Net Effect of All Adjustments*

The net effect of all these adjustments is that the private consumption tax base calculated by Kotlikoff et al. is $8,730.5 billion or 94.6 percent of PCE, while the private consumption tax base calculated by Gale is $8,585.2 billion or 93.1 percent of PCE. Our assumptions imply an intermediate value for the consumption tax base of $C_P = \$8,672.9$ or 94.0 percent of PCE.

*State and Local Government Consumption* $(C_{SL})$

The sales tax constructed in H.R. 25 would include state and local government consumption in the tax base. Although such a provision would clearly be highly controversial (and potentially raises constitutional issues), it can be justified on efficiency grounds in that it would equalize the tax treatment of private and public expenditures. In any case, both Gale and Kotlikoff et al. include estimates of state and local government consumption in their tax bases. Following the provisions of H.R. 25, this is calculated indirectly as (1) total current consumption expenditures

on purchases of inputs including labor, materials and services, net of capital consumption allowances (which are included in the NIPA as state and local government consumption expenditures), plus (2) investment spending, following the same prepayment approach used in the case of housing investment, less (3) the portion of state and local government spending that represents purchases of inputs into education, which is treated as investment in human capital rather than consumption. Although Gale and Kotlikoff et al. both follow this general approach, Kotlikoff et al. subtract only the labor costs of education, while Gale subtracts all state and local costs of providing education, including nonlabor costs and capital spending. For education costs, H.R. 25 specifies that tuition costs are fully deductible, but costs for room and board, sports activities, recreational activities, hobbies, games, and arts or crafts or cultural activities are not deductible. (It is unclear whether there would be an attempt to determine the portion, if any, of tuition payments that finance such nondeductible activities.) Determining the appropriate fraction of total state and local education expenditures that correspond to the nondeductible items would be exceedingly difficult. Accordingly, to err on the side of a conservative estimate of the tax rate required to achieve real revenue neutrality, we follow Gale in subtracting all state and local expenditures attributable to education, effectively assuming that the fraction of expenditures that goes to the nondeductible items is relatively small; this reduces the sales base by $302.3 billion. The net result is that the total state and local government consumption component of the tax base is $C_{SL} = \$754.6$ billion.

*Taxed Federal Government Spending* ($G_S$)

Applying the same rationale of equalizing the tax treatment of private and government spending, H.R. 25 would also tax federal government spending, calculated as expenditures on public inputs. Both Kotlikoff et al. and Gale calculate this as federal government consumption as measured in the NIPA, net of capital consumption expenditures, plus new capital expenditures (as a proxy for taxation of the federal government consumption produced by such investment). The only difference in the two calculations is that Kotlikoff et al. include subsidies to business ($49.4 billion) as government consumption, while Gale treats them as transfers to businesses that would not be subject to tax. Since the latter approach seems to be the more likely outcome, we do not include subsidies to business in the consumption tax base. The net result is $G_S = \$827.1$ billion.

*Untaxed Federal Government Spending* ($G_O$)

Kotlikoff et al. make two additional adjustments for federal government spending that would not be taxed under H.R. 25 and thus would not have to be indexed for tax-induced inflation. First, they include the taxable component of Social Security benefits, on the grounds that they would not be indexed since they are already taxed under the current system. Although such treatment would clearly be controversial especially since all other Social Security benefits would be fully indexed, we nevertheless adopt it since it is consistent with maintaining the real spending power of federal government transfers.

Second, Kotlikoff et al. also include interest payments on government debt in the category of untaxed federal government spending. Although such treatment is reasonable, when combined with their full indexation of the original government deficit by $(1+\tau)$, it effectively generates additional "revenue" for the government, since most of the increase in the nominal deficit is not offset by an increase in interest payments, which remain constant. In contrast, Gale indexes by $(1+\tau)$ only the primary deficit, defined as borrowing less net interest paid by the government. Since this more conservative treatment is more consistent with maintaining real government spending constant, we follow the Gale approach. This implies total untaxed federal government spending equals the taxable component of Social Security benefits or $G_O$ = \$129.3 billion.

*The Base of the Prebate*

Both Kotlikoff et al. and Gale calculate the base of the prebate under H.R. 25 in the same way—the aggregate amount of poverty-level consumption, adjusted to eliminate marriage penalties by setting the poverty level for two individuals to be twice that for a single individual. Their actual estimates, however, differ somewhat because both are projections. We redo their calculation using 2006 data, which yields *X*=\$2,084.4 billion.

*Calculation of Tax Rates*

Given these figures, the tax-inclusive tax rate *t* can be calculated from (7). For 2006, the Kotlikoff et al. approach yields a 26.5 percent rate, the Gale approach yields a 28.8 rate, and our

reconciliation of the two approaches yields a 28.0 percent rate. Expressed as tax-exclusive rates, these correspond to rates of 36.0 percent, 40.4 percent, and 38.9 percent.

*A Note on the Transition Tax Credit for Inventories*

H.R. 25 provides for a two-year tax credit for sales from inventories existing at the time of its enactment, to be taken at the time the inventory is sold. The credit is equal to the product of the book value for federal income tax purposes of the inventory as of the time of enactment times and sales tax rate. Following both Gale and Kotlikoff et al., we do not include this provision in our static rate calculation. However, the inventory credit is taken into account in our simulation results. Kotlikoff (2007) indicates that the total revenue cost of the FairTax credit for existing inventories would be $184 billion; in our simulations, we treat this as an increase in the revenue to be replaced by the sales tax, spread equally over the first two years after enactment of the tax. For the static rate calculation, this would increase the real revenue neutral tax-inclusive tax rate by 1.1 percentage points to 29.1 percent in the first year after reform.

*Caveats*

The analysis in this report assumes that the national retail sales tax is enacted as described in H.R. 25 (corrected to maintain real government expenditures constant). However, as noted above—and has been stressed elsewhere—such an assumption is quite heroic.[9] To the extent that a national retail sales tax in practice deviated from the extremely broad base envisioned in H.R. 25, its rate would have to be higher than the tax-inclusive tax rate of 28.0 percent calculated above. This would of course imply that the efficiency gains from enacting the reform would be reduced.

The final figures in Table 1 provide some examples—each taken in isolation—of the effects of reducing the comprehensiveness of the tax base under H.R. 25 by eliminating items that might be excluded from the base on political or social grounds. For example, if state and local consumption expenditures were not taxed, the tax base would decline by $758.2 billion and the required tax-inclusive tax rate would increase by 2.8 percentage points to 30.8 percent. If housing services (both new owner-occupied and rental) were removed from the tax base, it

[9] For example, see Gale (2005), Buckley and Rogers (2004), and Yin (2006).

would decline by $658.9 billion and the required tax-inclusive tax rate would increase by 2.4 percentage points to 30.4 percent. If medical services (physicians, dentists, other professional services, hospitals, and nursing homes) were not taxed, the base would decline by $1,438.5 billion and the required tax-inclusive tax rate would increase by 5.9 percentage points to 33.9 percent. If food purchased for off-premise consumption were removed from the tax base, it would decline by $762.6 billion and the required tax-inclusive tax rate would increase by 2.8 percentage points to 30.8 percent. Of course, more than one of these base reductions might occur under a "real world" national retail sales tax, so that the base reductions and associated rate increases would cumulate. Finally, as stressed by Gale (2005), any increased evasion under a national retail sales tax—beyond that already captured by transactions that are omitted in the NIPA (Kotlikoff et al. (2006)—would also reduce the base and increase the required tax rate. Thus, the tax-inclusive rate of 28.0 percent calculated in this report is clearly a lower bound, conditional on successful enactment and enforcement of all the provisions of H.R. 25.

## III. The Existing Literature on Consumption Taxes and Housing

Although most of the literature on fundamental tax reform in the form of replacing the income tax with a consumption-based tax has focused on its general, rather than sector-specific, effects, several studies have considered the effects of reform on housing (although most of these have analyzed the effects of the Flat Tax rather than a national retail sales tax). We provide a brief overview of these studies in this section, focusing first on owner-occupied housing and then on rental housing.

### A. Effects on Owner-Occupied Housing

One of the most contentious issues associated with implementing a consumption-based tax reform like the FairTax is its potentially negative effect on the price of existing owner-occupied housing. This potential price decline is due to a reform-induced increase in the user cost of housing,[10] as perceived by the owner-occupier, and the associated reduction in demand for owner-occupied housing. These changes arise for two reasons, both related to tax preferences for

[10] 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.

investment in owner-occupied housing under the current income tax.[11] First, the primary tax advantage enjoyed by owner-occupied housing under the current income tax is that the major component of the return to investment in housing—the imputed rent the owner-occupier earns in the form of housing services—is untaxed, while the returns to many other forms of investment are subject to tax and in some cases to double taxation due to the combined effects of the corporate and individual income taxes. In marked contrast, under a consumption-based tax such as the national retail sales tax, all (normal) returns to investment are untaxed, for both housing and nonhousing investments. As a result, equity-financed investments in nonhousing assets become relatively more attractive, which has the effect of raising the opportunity cost of equity-financed investment in owner-occupied housing and thus reducing the demand for such investment. Second, under H.R. 25, deductions for mortgage interest and property taxes are eliminated, which also reduces the relative attractiveness of investing in owner-occupied housing, especially for individuals who lack the funds to make significant equity-financed investments in owner-occupied housing.[12] Thus, the increase in the user cost of owner-occupied housing that would occur under H.R. 25 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. In the long run, however, the quantity of housing and the cost of housing would return to an equilibrium reflecting production costs, including the cost of land, and the effects of the new tax system.

Several analysts have commented on the impact of various consumption tax reforms (most commonly the Flat Tax) on housing prices, and the range of predicted effects is large. An analysis conducted by Data Resources, Incorporated, (Brinner et al., 1995) predicts that the

[11] For recent discussions of income tax preferences for owner-occupied housing, see Bourassa and Grigsby (2000) and Anderson, Clemens and Hanson (2006), as well as the report of the President's Advisory Commission on Federal Tax Reform (2005). These preferences are commonly argued to give rise to inefficient over-investment in owner-occupied housing (Rosen, 1985), although the extent to which this occurs depends on the extent to which the preferences are capitalized into housing land values (Bourassa and Grigsby, 2000). However, note that some preferential income tax treatment could be justified if it offsets the disincentive to investment in housing associated with the local property tax (to the arguably significant extent that it is a tax on capital, as described in Zodrow, 2001) or reflects positive externalities associated with owner-occupied housing (Glaeser and Shapiro, 2003; Dietz and Haurin, 2003). In particular, the latter argument, which was accepted in principle by the president's tax reform panel, implies that tax preferences should be specifically targeted toward encouraging the form of investment generating the positive externality. For example, if, as suggested by Glaeser and Shapiro (2002), the primary positive housing externalities arise when individuals own rather than rent, then income tax preferences should be targeted toward first-time home buyers (Gale, 2007).

present value of the loss of mortgage interest and property tax deductions alone would cause the aggregate value of owner-occupied housing to decline by 15 percent. Capozza, Green and Hendershott (1996), hereafter CGH, predict that implementing a Flat Tax would reduce owner-occupied housing prices by an average of 20 percent, assuming that interest rates fall by one percentage point, and by nearly 30 percent if interest rates remained constant. By comparison, Gravelle (1996) and Bruce and Holtz-Eakin (1999), hereafter BHE, argue that both the short run and the long run effects of a Flat Tax on housing prices would be fairly small. Similarly, Hall (1997) argues that implementation of the Flat Tax would result in a rather modest decline in the aggregate price of housing, assuming a two percentage point decline in the interest rate.

The case for large consumption tax reform-induced declines in housing prices is illustrated by CGH. They estimate the reform-induced change in the price of owner-occupied housing using an asset market equilibrium model that incorporates a perfectly inelastic supply of residential land. Given this assumption, a change in the tax treatment of owner-occupied housing must be fully capitalized into the price of owner-occupied housing. Their model predicts that implementing the Flat Tax at a rate of 17 percent, holding constant the before-tax rate of interest, would reduce owner-occupied housing prices by an average of 29 percent. However, since they believe some reduction in interest rates is likely, they report that the average house price would decline by 20 (9) percent if the before-tax interest rate declines by 1 (2) percentage point(s).[13] [14]

Other studies cast doubt on such large price declines and shift the focus to the dynamic factors that would mitigate the effects of a consumption tax reform on the price of housing. For example, BHE employ a dynamic simulation model of the owner-occupied housing market that is capable of analyzing the partial equilibrium transition path of enacting a Flat Tax on the price of owner-occupied housing.[15] In their model, housing supply is modeled using a Cobb-Douglas

[12] Gravelle (1996) estimates the impact on housing prices of the first effect is roughly twice that of the second.

[13] They also note that housing price effects would vary widely across geographical areas, and that the largest price declines in percentage terms would occur for expensive urban homes that are typically owned by individuals with high marginal tax rates.

[14] Holtz-Eakin (1996) notes in his comments on the CGH paper that calculations with more recent data suggest much smaller price declines, e.g., only 15 percent rather than 29 percent under a Flat Tax reform with no decline in interest rates.

[15] BHE implicitly make the somewhat unusual assumption that the Federal Reserve would accommodate the Flat Tax, which would imply that the price level—including the price of new and thus (in equilibrium) existing owner-occupied housing—would increase proportionally by the rate of the tax. Note, however, that this one-time increase

production function that depends on inputs of structures and land, thus capturing the fact, stressed by CGH, that the supply response of land is more inelastic than the supply response of structures. They assume an elasticity of supply for land equal to 0.2 and an elasticity of supply for structures equal to 0.8.[16] Their results indicate that the short-run impact of enacting a 17 percent Flat Tax, assuming the before-tax rate of interest is constant, would be a 10 percent increase in the nominal price of owner-occupied housing. This implies that the real price of owner-occupied housing would decline by roughly 6 percent. In the long run, a smaller stock of capital would be employed in the production of owner-occupied housing and nominal housing prices would increase by 17 percent, leaving real housing prices unchanged. Most of the adjustment in this model occurs within 10 years of the reform.[17]

Gravelle (1996) also finds that switching to a Flat Tax would likely have a small effect on the price of owner-occupied housing in the short run and a negligible effect in the long run. She argues that several factors would mitigate the decline in the price of owner-occupied housing in the short run. These factors include reductions in new construction, the propensity for owners to temporarily remove existing houses from the market in response to temporary price declines, the conversion of owner-occupied houses to rental houses, and short run technology and capacity constraints that limit profitable investment in other sectors.

Starting with a set of worst-case assumptions—the supply of housing is perfectly inelastic, housing demand is unit elastic, and the before-tax interest rate is constant—Gravelle finds that owner-occupied housing prices would fall by 22 percent. Modifying the assumptions to reflect the fact that the short-run supply of housing is not perfectly inelastic and that interest rates are likely to decline if a Flat Tax were implemented moderates the decline in the price of housing. If the elasticity of supply for owner-occupied housing is increased from zero to 0.5, the decline

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in the price of housing does not reflect a change in the real value of owner-occupied housing; rather, as described above, it reflects the fact that owner-occupied housing is not subject to the potential capital levy associated with the implementation of a consumption tax. Any decline in the real price of owner-occupied housing in the BHE model reflects the changes in consumer demand stressed by CGH.

[16] CGH argue that the large supply elasticities used in this study are responsible for the small impacts of reform on housing prices. They suggest that the structures elasticity might be on the order of 0.02 and the land elasticity could be even lower.

[17] Somewhat surprisingly, this model yields a nominal short-run increase in the price of owner-occupied housing that is quite similar to the single-factor version of their model that ignores land. However, in the two-factor model the adjustment period is roughly twice as long as in the model that ignores land.

in housing prices is reduced from 22 percent to 13 percent. If the supply of housing is unit-elastic and the interest rate falls by one percentage point, then the decline in the price of owner-occupied housing is reduced from 22 percent to 5 percent. Gravelle argues that in the long run, the impact of a consumption tax reform on the price of owner-occupied housing is likely to be very small since the supply of housing is more elastic in the long run.

The analysis in this report of course focuses solely on the FairTax and its effects on housing and other assets, although the effects of the Flat Tax are generally similar as they are both flat rate consumption-based taxes with provisions designed to eliminate tax on the poor. The analysis also captures the very different treatments under the FairTax of the consumption services generated by existing housing, which are exempt from the tax, and services from new housing, which are subject to the tax since new investment in owner-occupied housing is taxed as a proxy for taxing all future housing consumption services generated by that investment.[18] Such differential treatment mitigates the negative effect of implementing the FairTax on housing values, since only housing consumption services from new housing are subject to tax, which implies that owners of existing housing will not suffer the immediate real capital loss that would occur if the consumption services generated by old housing were taxed under the new system (e.g., by imputing a return to the value of existing homes as determined for local property taxation and including that return in the FairTax base).[19]

The housing component of the model used in this report captures most of the important factors discussed by Brinner et al. (1995), CGH, BHE, and Gravelle (1996). The model explicitly accounts for changes in the level of new investment and the reallocation of the existing capital stock across the nonresidential, owner-occupied housing, and rental housing sectors, and includes the effects of the costs of adjusting the capital stock. In addition, changes in consumer demands across rental and owner-occupied housing, including those changes attributable to the elimination of deductibility of home mortgage interest and property taxes, as well as changes in demands for the nonresidential good, are considered. Reform-induced increases in the overall

[18] This treatment of the services provided by existing and new owner-occupied housing is similar to that which occurs under the Flat Tax, which also does not tax the services produced by existing housing (Gravelle, 1996).
[19] Another way of thinking about this is that the nominal price of old housing will rise to match the price of new housing, thus insulating the owners of existing housing from a decline in the real value of their assets.

level of investment are captured as well. It should be noted, however, that a weakness of the approach used in the model is that land is not modeled explicitly. Instead, the difficulties of converting land used initially for owner-occupied housing to other uses are captured indirectly by including the costs of adjusting the housing capital stock in the analysis. These costs are assumed to be symmetric—that is, to follow the same quadratic pattern for both declines and increases in investment, relative to the steady state level—and reflect the costs of reducing the level of new investment, reducing the level of replacement investment, converting owner-occupied housing to rental housing, and finally, if necessary, converting owner-occupied housing to production of the nonresidential good.

**B. Effects on Rental Housing**

The effects of implementing H.R. 25 on rental housing are quite different from those on owner-occupied housing. Instead, since rental housing is a business asset, the asset price effects that would be experienced in the rental housing sector are similar—although generally more pronounced—than those in other business sectors. These business asset price effects have been the focus of many discussions of the transitional issues raised by the implementation of a consumption-based tax like the FairTax.

These discussions, including Sarkar and Zodrow (1993), Bradford (1996), Pearlman (1996), and Zodrow (2002), have focused on the potential one-time windfall loss or "hit" that might be imposed on existing assets by the implementation of a consumption-based tax reform. In the case of a sales tax with price accommodation, capital asset values would not change (since they are not subject to tax) but the prices of all (taxed) consumption goods would increase by the amount of the tax. As a result, the owners of existing assets would experience a one-time windfall loss in real purchasing power. Alternatively, prior to reform, retailers would include gross receipts in their tax base, but get deductions for depreciation on capital assets and withdrawals from inventory. By comparison, under H.R. 25, only the taxation of gross receipts occurs (with the temporary exception of sales from inventories which are provided the transitional two-year tax credit described above), resulting in a one-time decline in the real value of existing assets, relative to new assets. In the absence of other considerations, the one-time windfall loss

experienced by owners of existing capital can be large. For example, Gravelle (1996) constructs a simple model in which the decline in capital asset prices is proportional to the rate of tax.

However, as described by Zodrow (2002), this analysis ignores a wide variety of other factors associated with the implementation of a consumption-based tax that would also affect existing business capital owners, most of which would act to reduce the one-time windfall tax on existing assets or offset its negative welfare effects. 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[20]; (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[21]; 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 business sectors.[22]

Several studies have attempted to predict the net effect of some of these factors on business asset values (in a one-sector model). For example, Altig et al. (2001) find that the implementation of the Flat Tax reduces average asset values in the year of the reform by 3.6 percent when adjustment costs are included in their model, and by 10 percent in the absence of adjustment

[20] We make the conventional assumption that the costs of adjusting the capital stock are quadratic.
[21] This point is stressed by Lyon and Merrill (1999).
[22] The model tends to overstates transitional losses for two additional reasons. First, to the extent 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 TPA Model is based on the "traditional" view of dividend taxation, it does not capture this effect. One potential extension of the model is to allow some "traditional view" firms and some "new view" firms, consistent with the evidence presented in Auerbach and Hassett (2003). Second, as stressed by Hubbard (2002), the primary difference between income and consumption taxes is that only the latter exempts normal returns to capital; by comparison, above-normal returns and the returns to risktaking are treated similarly under income and consumption taxes, so that little change in the tax treatment of these components of the return to capital would result from reform. Since the model is characterized by perfect competition and certainty, it does not consider these factors In particular, as discussed by Auerbach (forthcoming), treating all of the return to capital as normal returns in the simulations of the

costs. Auerbach (1996) finds that implementing a Flat Tax would cause average asset values to decline initially by 5.7 percent without adjustment costs but to increase by 3 percent in the presence of adjustment costs. These findings suggest that the magnitude of the reform-induced windfall losses imposed on business equity assets are much smaller, and may even be fully offset, once the factors noted above are considered.

However, these results in one-sector models do not consider potentially important differences in reform-induced asset price changes across different types of assets. This is especially true for the case of rental housing, where the capital asset has an extremely long life. Thus, transitional windfall losses in the rental housing sector may be unusually large. In addition, capital reallocation across sectors (in the presence of adjustment costs) plays an important role in determining the asset price effects. All of these factors are considered explicitly in the Tax Policy Advisers model.

## IV. Model Structure and Calibration

The distinguishing feature of the analytical approach used in this report is the treatment of owner-occupied and rental housing markets in the context of a dynamic overlapping-generations life-cycle computable general equilibrium model that explicitly calculates the transitional and long run reform-induced changes in all macroeconomic variables and all asset values, including the values of owner-occupied and rental housing, in response to the implementation of a new tax regime such as H.R. 25. The model has three production sectors—owner-occupied housing, rental housing, and a nonresidential composite good sector that includes all nonhousing goods and services. The time paths of investment demands in all three sectors are modeled explicitly, taking into account capital stock adjustment costs. On the consumption side, the tax advantages of owner-occupied housing relative to other assets under the current income tax are taken into account in modeling the demands for the three goods. Thus, the model allows a fairly detailed description of both the transitional and the long run effects of implementing a consumption-based tax reform, such as H.R. 25, in the markets for owner-occupied and rental housing, as well as in the market for the nonresidential composite good. It should be noted, however, that the

effects of tax reform may significantly overstate the gains that could be achieved with a consumption tax reform.

treatment of housing is less detailed than in some of the partial equilibrium studies described above, since land is not considered and the model does not allow for multiple income groups within each generation. This section outlines the basic structure of the model, which combines various features from similar and well-known models constructed by Auerbach and Kotlikoff (1987), Goulder and Summers (1989), Goulder (1989), Keuschnigg (1990), Fullerton and Rogers (1993), and Hayashi (1982). A more detailed description of the model is provided in the appendix, and the complete details are provided in Diamond and Zodrow (2005).

### A. The Nonresidential Production Sector

Firms in the nonresidential production sector produce output using a constant elasticity of substitution (CES) production function with capital and labor as inputs. Firms choose the time path of investment to maximize the present value of firm profits or, equivalently, maximize firm value, net of all taxes and subject to quadratic costs of adjusting the capital stock. Total taxes in the nonresidential production sector include the federal corporate income tax (in the initial income tax equilibrium) and state and local corporate income and property taxes. Each firm is assumed to maintain a fixed debt/asset ratio and pay out a constant fraction of earnings after taxes and depreciation in each period.

The model assumes individual level arbitrage, which implies that the after-tax return to bonds must equal the after-tax return received by the shareholders of the firm. The value of the firm in the nonresidential sector equals the present value of all future net distributions to the owners of the firm.

### B. The Owner-Occupied and Rental Housing Production Sectors

Housing is produced in the owner-occupied and rental housing production sectors where, following Goulder and Summers (1989) and Goulder (1989), rental housing is produced by noncorporate landlords while owner-occupied housing is both produced and consumed by the owners themselves (that is, owner-occupiers are assumed to choose capital and labor inputs which they combine to produce housing that they “rent” to themselves). The technology used in the production of rental housing and owner-occupied housing is assumed to be identical—capital

and labor combined in the same CES production function. Landlords and owner-occupiers are also are assumed to choose time paths of investment to maximize the equivalent of firm value, net of total taxes.

In the case of the rental housing sector, the firm is modeled as a noncorporate entity. This implies that in the initial income tax equilibrium, landlords must pay the state/local property tax and are then subject to income taxation only at the individual level. Under H.R. 25, all residential housing rents, including those attributable to existing rental housing capital, are included in the retail sales tax base, with no additional federal taxes.

In the owner-occupied housing sector, the income tax burden in the initial equilibrium takes into account the facts that imputed rents are untaxed and maintenance expenditures are not deductible, while mortgage interest and property taxes are deductible. The treatment under H.R. 25 is somewhat more complicated, following the approach described above, under which new investment in owner-occupied housing is taxed as a proxy for taxation of all future consumption of housing services. Thus, owner-occupiers pay an "up-front" tax on investment in new housing, but all future housing services generated by that investment are untaxed—treatment that is equivalent to taxing such services like any other form of consumption. Note that the consumption of owner-occupied housing services produced by "old" housing capital—that is, owner-occupied housing existing at the time of enactment of the FairTax, is not subject to the national retail sales tax, one of the relatively few consumption goods not included in the tax base.

In all cases, optimal investment paths are calculated as described above, taking into account the costs of adjusting the capital stock, which are assumed to be quadratic.

### C. Individual Behavior

On the individual side, the model has a dynamic overlapping generations framework with fifty-five generations alive at each point in time. There is a representative individual for each generation, who has an economic life span (which begins upon entry into the work force) of fifty-five years, with the first forty-five of those years spent working, and the last ten years spent in retirement. Individual tastes are identical so that differences in behavior across generations are

due solely to differences in lifetime budget constraints. An individual accumulates assets from the time of "economic birth" that are used to finance both consumption over the life cycle, especially during the retirement period, and the making of bequests. The model follows Fullerton and Rogers (1993) in including a relatively primitive "target model" of bequests, with the real values of bequests assumed to be fixed and thus unaffected by changes in economic conditions, including changes in income.

The representative consumer in each cohort is assumed to choose the time paths of consumption and leisure to maximize rest-of-life utility, which is a discounted sum of annual utilities, subject to a lifetime budget constraint that requires the present value of lifetime wealth including inheritances to equal the present value of lifetime consumption including bequests. Annual utility is assumed to be a CES function of consumption of an aggregate consumption good and leisure, and individuals are assumed to have a hump-backed wage profile over their life cycles. The aggregate consumption good is modeled as a CES function of the nonresidential consumption good and aggregate housing services, with aggregate housing services in turn modeled as a CES function of owner-occupied and rental housing services. The mix between owner-occupied and rental housing (and in turn the homeownership rate) is thus determined as the utility-maximizing response of individuals to the relative prices of these two goods, taking into account (under the original income tax) the tax preferences favoring owner-occupied housing, including exemption of imputed rents, deductibility of home mortgage interest and property taxes, and very low rates of capital gains taxation.

### D. Government Behavior

The model treatment of the federal government generally follows the description provided in Section II. In the initial equilibrium, federal income tax revenues are raised from a flat-rate corporate income tax and a progressive personal income tax on wage income, coupled with flat-rate taxes on dividends, interest and capital gains. These revenues are used to finance purchases of nonresidential goods, housing services, and income transfers. The model includes a simple Social Security structure under which an exogenous level of benefits is financed with a flat-rate payroll tax. A combined state and local government sector raises a fixed amount of revenue from sales taxes, property taxes, and corporate and personal income taxes that piggyback on the

federal income tax structure.

Under H.R. 25, a flat-rate sales tax is applied to most consumption as described above, with the primary exception being the housing services attributable to owner-occupied housing existing at the time of implementation of the tax. New investment in owner-occupied housing is taxed under the "prepaid" approach outlined previously. Consumption expenditures by federal and state and local government consumption and nonprofit institutions are included in the tax base. Financial intermediation services are included as part of the general goods and services consumption tax base. Federal revenues also must finance the sales tax prebate, which is designed to reimburse the costs of the tax for all households below the poverty level of income.

### E. Model Calibration

The model is calibrated by choosing a number of parameter values and economic variables so that the initial income tax steady state in the base year, which is the year of enactment of reform, closely resembles the prevailing features of the U.S. economy in 2006. Parameter values are chosen to be consistent with empirical estimates and parameter values used in other CGE studies, especially AAKSW (2001), Auerbach and Kotlikoff (1987), Auerbach (1996), and Fullerton and Rogers (1993).[23] Table 2 shows the values for the most important utility function parameter values in the model. The values for various macroeconomic variables are generally chosen to be consistent with estimates from the National Income and Product Accounts for 2006.

[23] For a discussion of the choice of parameter values in computational general equilibrium models, see Gunning, Diamond, and Zodrow.

## Table 2
## Utility Function Parameter Values

| Symbol | Description | Value |
|---|---|---|
| $\rho$ | Rate of time preference | 0.001 |
| $\sigma$ | Intertemporal elasticity of substitution | 0.38 |
| $\varepsilon$ | Intratemporal elasticity of substitution | 0.8 |
| $\sigma_{CH}$ | Elasticity of substitution for composite good and housing | 0.8 |
| $\sigma_{TN}$ | Elasticity of substitution for taxed and nontaxed goods | 0.5 |
| $\sigma_{RO}$ | Elasticity of substitution for rental and owner housing | 0.8 |
| $\alpha_E$ | Utility weight on leisure | 0.17 |
| $\alpha_C$ | Utility weight on composite consumption | 0.83 |
| $\alpha_G$ | Utility weight on composite nonresidential consumption | 0.78 |
| $\alpha_H$ | Utility weight on composite housing consumption | 0.22 |
| $\alpha_{GT}$ | Utility weight on taxed nonresidential consumption | 0.95 |
| $\alpha_{GN}$ | Utility weight on nontaxed nonresidential consumption | 0.05 |
| $\alpha_O$ | Utility weight on owner-occupied housing | 0.73 |
| $\alpha_R$ | Utility weight on rental housing | 0.27 |

The parameter value choices in the model can be summarized as follows. The rate of time preference, ρ, is set equal to 0.001. In CGE models, the rate of time preference (or individual discount rate) is typically chosen in tandem with the intertemporal and intratemporal elasticities of substitution to generate reasonable levels of saving and investment and labor supply in the initial steady state. Using the Euler equation approach, Ziliak and Kneisner (1999) estimate the rate of time preference under two alternative specifications that yield values of 0.001 and 0.013. Jorgensen and Yun (2001) estimate a higher value of 0.02. The value of 0.001 that we choose is at the low end of these estimates but is consistent with other CGE studies, including Altig et al. (2001).

The elasticity of intertemporal substitution (σ) determines the willingness of consumers to substitute consumption across periods in response to changes in the relative prices of consumption, and thus plays a critical role in establishing the responsiveness of saving to the enactment of a consumption tax. Empirical studies using aggregate consumption data typically find that the EIS is between zero and one. The range of assumed values for the EIS used in CGE models is quite small, primarily because the chosen value must generate a steady-state capital stock that is consistent with the data. Auerbach and Kotlifoff (1987), Fullerton and Rogers (1993), Jorgenson and Yun (2001), Altig et al. (2001), and Diamond and Zodrow (2007) all assume a value of the EIS between 0.25 and 0.50, depending partly on the interaction of the EIS with the choice of the rate of time preference parameter. We assume the EIS is equal to 0.38. This moderately high value can also be justified by the inclusion of a "target" bequest motive, which tends to reduce the magnitude of the saving responses in the model.

In CGE models, the intratemporal elasticity of substitution (ε) and the percentage of the endowment devoted to leisure are key parameters that determine the compensated and uncompensated wage elasticities. The intratemporal elasticity of substitution determines consumer willingness to substitute between labor supply and leisure in response to changes in their relative prices and is thus critical in determining the labor supply response to a change in the after-tax wage. In addition, a relatively large share of the initial time endowment devoted to leisure implies that the percentage change in labor supply associated with an increase in the wage rate for a given value of the intratemporal elasticity of substitution will also be relatively

large. We assume the intratemporal elasticity of substitution is equal to 0.8 and that the share of the time endowment devoted to leisure is 19.4 percent.[24]

The elasticities of substitution between the nonresidential goods and aggregate housing consumption ($\sigma_{CH}$) and between rental and owner housing ($\sigma_{RO}$) are chosen so that the values of the compensated own-price elasticities of owner and rental housing are both roughly –0.8 as reported in Rosen (1985).[25] The various weighting parameters in the utility function are set to replicate as closely as possible the actual pattern of aggregate consumption for the three goods in the model.

Table 3 shows the values for the most important technological and growth rate parameter values in the model. It is assumed that the rate of population growth is equal to 0.01 and the rate of technological growth is equal to 0.01. The various weighting parameters in the production function are set to replicate as closely as possible the actual pattern of aggregate production for the three goods in the model.

[24] This implies that the aggregate labor supply elasticity is approximately 0.155, which is near the middle of the wide range of empirical estimates. This value is significantly lower than the value assumed in Altig et al. (2001) and Auerbach and Kotlikoff (1987), but yields an aggregate labor supply elasticity that is consistent with most of the empirical literature; it is, however, inconsistent with the relatively large labor supply elasticities found in the recent work of Prescott (2005) and Davis and Henreckson (2005).

[25] Estimates of housing demand elasticities span a wide range. DiPasquale and Wheaton (1994) report an estimated housing demand elasticity equal to –0.15, while Riddel (2004) reports an estimated housing price elasticity of –1.5.

## Table 3
## Technological Parameter Values

| Symbol | Description | Value |
|---|---|---|
| N | Population growth rate | 0.01 |
| G | Technological growth rate | 0.01 |
| $\alpha_1$ | Capital share in nonresidential good production | 0.21 |
| $\alpha_2$ | Capital share in housing production | 0.99 |
| $\beta_X$ | Nonresidential good adjustment cost parameter | 5 |
| $\beta_{rh}$ | Rental housing adjustment cost parameter | 5 |
| $\beta_{oh}$ | Owner housing adjustment cost parameter | 5 |
| $\mu_X$ | Nonresidential good adjustment cost parameter | 0.1101 |
| $\mu_h$ | Housing adjustment cost parameter | 0.0501 |
| $\zeta$ | Dividend payout ratio in the nonresidential sector | 0.68 |
| $b_X$ | Debt-to-capital ratio in nonresidential good sector | 0.35 |
| $b_{rh}$ | Debt-to-capital ratio in the rental sector | 0.35 |
| $b_{oh}$ | Debt-to-capital ratio in the owner-occupied sector | 0.5 |
| $\delta$ | Economic depreciation in the nonresidential sector | 0.09 |
| $\delta_h$ | Economic depreciation in the housing sector | 0.025 |

The size of adjustment costs and the extent to which the existing capital is discounted (relative to new investments) under the existing income tax due to the existence of accelerated depreciation allowances and bonus depreciation are also important determinants of the magnitude of asset price effects predicted by the model. We assume that the adjustment cost parameter $(\beta_X)$ in the nonhousing production sector is equal to 5, which is a compromise between the estimates presented in Cummins, Hassett, and Hubbard (1994), Shapiro (1986), and the value of 10 used by Auerbach (1996) and Altig et al. (2001), as well as the earlier and considerably larger estimates presented in Summers (1981). In the absence of data on the values of the adjustment cost parameters in the owner-occupied and rental housing sectors, these values are assumed to equal the value of the adjustment cost parameter in the nonresidential sector (although the values need not necessarily be equal). 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 nonresidential and rental sectors is equal to $12.4 trillion.[26] Table 4 shows the initial steady state values for output, the stock of capital, firm value, investment, and earnings in each sector, which are calibrated to data from the U.S. Bureau of Economic Analysis (2007).

**Table 4**

**Initial Steady State Base Year Values ($ billions)**

| | Nonhousing | Rental Housing | Owner Housing | Total |
|---|---|---|---|---|
| Output | 11690 | 432 | 1072 | 13194 |
| Capital | 12757 | 3711 | 11205 | 27673 |
| Wages | 9469 | 4.3 | 11 | 9523 |
| Firm Value | 7481 | 2403 | 5602 | 15486 |
| Investment | 1405 | 167 | 505 | 2077 |
| Earnings | 1850 | - | - | 1850 |
| Services | - | 79 | 178 | 257 |

[26] The $12.4 trillion is derived by adjusting a 2002 undepreciated basis of $8.3 trillion (from an unpublished estimate provided by Joint Committee on Taxation) for growth in the size of the capital stock and by calibrating the

**Table 5**

**Initial Steady State Base Year Taxes ($ billions)**

| | Base Year Values | Target | Source |
|---|---|---|---|
| Federal Taxes | 2327 | 2327 | NIPA |
| Income | 1378 | 1425 | NIPA |
| Payroll | 948 | 901 | NIPA |
| State Taxes | 1233 | 1233 | NIPA |
| Income | 450 | 450 | NIPA |
| Sales | 415 | 415 | NIPA |
| Property | 367 | 367 | NIPA |
| H.R. 25 Tax Base | 10266 | 10267 | Calc. |
| Private | 8682 | 8681 | NIPA |
| Government | 1585 | 1585 | NIPA |

Table 5 shows the initial steady state values for federal and state tax revenues in the base year (2006). The federal and state tax systems raise $3,560 billion in total tax revenue in the base year, with federal taxes raising $2,327 billion and state and local taxes raising $1,233 billion The Social Security payroll tax raises $948 billion, which is assumed to equal the amount of Social Security benefits. The remaining federal taxes are raised by corporate and individual income taxes. The state and local government sector raises $450 billion in income taxes ($61 billion in business income taxes and $389 billion in personal income taxes), $415 billion in retail sales taxes, and $367 billion in property taxes. In the initial steady state, the retail sales tax base under H.R. 25 is $10,266 billion, consistent with the derivations presented above.

Table 6 shows the federal and state tax rates in the initial steady state. The income-weighted average marginal wage tax rate is equal to 25.2 percent and the average wage tax rate is 21.0 percent.[27] The tax rate on individual interest income is 14.7 percent and the tax rate on dividends

model to the estimated discount of capital reported in Auerbach (1996).

[27] The value of the income-weighted marginal wage tax rate is based on data presented in the report of the

is 12 percent. Capital gains in the nonresidential and rental housing sectors are taxed at an effective annual accrual rate of 5 percent and capital gains in the owner-occupied housing sector are untaxed.[28] The payroll tax is 10 percent, lower than the actual 15.6 percent rate because all wage income in the model is subject to the payroll tax (that is, Social Security contributions are not capped, as they are under current law). Social Security benefits are taxed at an average rate of 7.2 percent. The effective tax rate in the nonresidential sector is 28.8 percent, and the effective tax rate in the rental housing sector is 20.5 percent.[29] Federal government expenditures are 18.3 percent of GDP. Government debt is set so that the debt to GDP ratio is 35.4 percent, consistent with observed data. This ratio is constant in the steady state.

The state retail sales tax rate is set at 5.6 percent. The average property tax rate on capital in the nonresidential sector is 0.8 percent, and the average property tax rate on residential capital is 1.9 percent. The average state tax rate on personal income is set at 4.4 percent and the business tax rate at 9.5 percent, so that personal and business state income tax revenues are consistent with data in U.S. Bureau of Economic Analysis (2004). State and local expenditures are assumed to equal state and local tax revenues. Under H.R. 25, state and local governments are assumed to adjust their sales tax rates so that real government expenditures are constant.

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President's Advisory Panel on Federal Tax Reform (2005).

[28] The effective annual accrual tax rate on capital gains in the owner-occupied housing sector is assumed to equal zero, since the Taxpayer Relief Act of 1997 exempted gains up to $250,000 on the sale of a house for single taxpayers and up to $500,000 for married taxpayers filing a joint return.

[29] The corporate share of the nonresidential sector is 61.5 percent, and the corporate share of the rental housing sector is 10 percent.

**Table 6**

**Initial Steady State Federal and State Tax Rates**

| Symbol | Description | Value |
|---|---|---|
| | Federal Taxes | |
| $\tau_{wmarg}$ | Income-Weighted Marginal Wage Tax Rate | 0.251 |
| $\tau_{wave}$ | Average Wage Tax Rate | 0.21 |
| $\tau_{d}$ | Dividend Tax Rate | 0.12 |
| $\tau_{i}$ | Interest Income Tax Rate | 0.18 |
| $\tau_{g}$ | Nonresidential good Capital Gains Tax Rate | 0.05 |
| $\tau_{gr}$ | Rental Housing Capital Gains Tax Rate | 0.05 |
| $\tau_{go}$ | Owner Housing Capital Gains Tax Rate | 0 |
| $\tau_{s}$ | Social Security Tax Rate | 0.1 |
| $\tau_{sb}$ | Social Security Benefit Tax Rate | 0.072 |
| $\tau_{b}$ | Effective Nonresidential good Business Tax Rate | 0.288 |
| $\tau_{rs}$ | Effective Rental Housing Tax Rate | 0.206 |
| | **State Taxes** | |
| $\tau_{c}^{st}$ | Sales Tax Rate | 0.056 |
| $\tau_{p}^{r}$ | Housing Property Tax Rate | 0.019 |
| $\tau_{p}^{nr}$ | Nonresidential Good Property Tax Rate | 0.008 |
| $\tau_{b}^{st}$ | Average Business Tax Rate | 0.095 |
| $\tau_{w}^{st}$ | Average Wage Tax Rate | 0.044 |

## V. Simulation Results

In this section we report the results of simulating the adoption of the national retail sales tax described in H.R. 25 using the TPA model. As described above, H.R. 25 would repeal the federal corporate and individual income taxes (including their alternative minimum tax versions),

payroll taxes for Social Security and Medicare, and estate and gift taxes and replace them with a flat-rate tax on most consumption expenditures coupled with a universal "prebate" designed to eliminate the burden of the new tax for those living at or below the poverty level of income. The reform is assumed to be unanticipated, and the only transition rule is the FairTax's two-year tax credit for sales from existing inventories. The required tax-inclusive (tax-exclusive) sales tax rate including dynamic changes in the tax base under H.R. 25 is 27.7 (38.3) percent in the year of reform, which corresponds reasonably closely to the values calculated in the static tax base analysis presented above. In the model simulation, the tax-inclusive (tax-exclusive) sales tax rate gradually declines to a long-run steady state value of 26.1 (35.3) percent. The following discussion begins with a summary of the macroeconomic effects of the enactment of H.R. 25 on prices, output, investment, and the allocation of capital, and then examines the changes in business equity prices and owner-occupied and rental housing prices that are one of the key issues analyzed in this report. All changes are expressed in real terms—that is, they are deflated to take into account the increase in prices associated with the implementation of the national retail sales tax under the assumption that the Federal Reserve would accommodate a one-time increase in the price level as discussed above.

### A. Macroeconomic Effects

Table 7 shows the macroeconomic effects of implementing H.R. 25 in the TPA model. Consider first the time paths of the wage rate and interest rate. In the year of enactment, the before-tax wage rate declines initially by 0.5 percent as labor supply increases immediately by 2.8 percent (note that the model is constructed so that the capital stock is fixed in the year of enactment). Labor supply increases because the income-weighted real after-tax wage rate increases by 17.4 percent in the year of reform (22.2 percent in the long run), as the relatively low-rate sales tax replaces the higher level of wage taxation that occurs under the existing income and payroll taxes.[30] In addition, an increase in the after-tax interest rate causes individuals to substitute future consumption and leisure for current consumption and leisure. Note that a part of the increase in

[30] Marginal tax rates on wage income decrease with the enactment of reform because under H.R. 25, the sales tax base minus the prebate ($9.7 trillion) is larger than the income tax base in the initial steady state, given the amount of deductions under the existing income tax system, even though the potential income tax base is larger than the potential sales tax base. In addition, the greater progressivity of the current income tax system relative to H.R. 25 also increases average marginal tax rates in the model given the humpbacked shape of the age-wage profile, the increase in marginal rates with income, and the share of income in each age cohort, as does the payroll tax.

the real after-tax wage rate and the resulting increase in labor supply is attributable to the reform-induced reallocation of capital from owner-occupied housing into the much more labor-intensive production of the nonresidential composite good (discussed below), which stimulates the demand for labor. The wage rate then rises over time as increased saving leads to a higher capital-labor ratio. In the long run steady state, the before-tax wage rate is 1.1 percent higher and the capital-labor ratio is 2.1 percent higher than in the initial steady state. The before-tax interest rate is 1.3 percentage points lower in the long run steady state, with most of the decline occurring within 2 years after reform. The after-tax interest rate initially increases by 1.5 percentage points and then declines steadily to a value 0.2 percentage points lower than in the initial steady state.

Increased labor supply implies that gross domestic product (GDP) increases by 2.1 percent in the year of reform. In subsequent years, this is augmented by increased saving and investment such that GDP increases by 2.9 percent five years after reform and by 3.8 percent in the long run. In the nonresidential sector, output is 2.3 percent larger in the year of reform and 4.0 percent larger in the long run steady state. In the rental housing sector, output is unchanged in the year of reform but increases by 7.4 percent in the long run. In the owner-occupied housing sector, output falls by 1.0 percent two years after the enactment of reform and by 1.7 percent five years after the enactment of reform. However, the decline in output in the owner-occupied housing sector is eventually reversed, and there is no change in the long run.

The switch from an income-based to a consumption-based tax system—which is characterized by a marginal effective tax rate of zero on investment income—creates a more attractive environment for new investment, at least in the two production sectors that are most affected by the income tax, the nonresidential and rental housing sectors. Investment in the nonresidential sector increases by 8.9 percent ($125 billion) in the year of reform, and then remains roughly 7.5 to 8.0 percent larger than in the initial steady state for the five years following the year of reform. Nonresidential investment increases by 8.9 percent in the long run. Investment in the rental (multifamily) housing sector increases by 12.7 percent ($21 billion) in the year of reform and by 11.0 percent two years later, and continues to decline gradually, with an increase of 10.9 percent after five years and 7.7 percent in the long run.

By comparison, although investment in the owner-occupied (single family) housing sector is also treated generously under the new tax regime (it faces a marginal effective tax rate of zero as well), it loses its advantage relative to other forms of investment under the sales tax regime. In addition, the demand for owner-occupied housing declines due to the elimination of deductions for home mortgage interest and property taxes. As a result, investment in owner-occupied housing initially decreases significantly—by 18.6 percent or $94 billion in the year of reform, and by 9.0 percent ($47 billion) two years after reform. The reduction in investment in owner-occupied housing moderates over time, however, with a decline of 4.5 percent five years after reform and ultimately a slight decline of 0.1 percent in the long run.

These changes imply a reallocation in investment, away from owner-occupied housing and toward the rental housing and nonresidential sector. In the initial income tax equilibrium, residential fixed investment is 32.4 percent ($672 billion) of total fixed investment ($2,077 billion). In the year of enactment of H.R. 25, residential fixed investment falls to 28.2 percent ($600 billion) of total fixed investment ($2,129 billion). The investment share of residential fixed investment then increases gradually to 30.0 percent ($672 billion) two years after reform and 30.6 percent ($738 billion) five years after reform. The residential investment share is 30.9 percent in the long run, which represents a long run decline of the share of residential fixed investment of 1.5 percentage points. Note that in the long run, residential fixed investment is only 0.1 percent smaller than under the income tax because total fixed investment increases in response to enactment of the national retail sales tax.

These effects on the investment share of residential investment can be broken down into effects on the investment shares of owner-occupied and rental housing. The share of owner-occupied (single family) housing investment as a share of total fixed investment is 24.3 percent ($505 billion of $2,077 billion) in the initial equilibrium under the income tax. The investment share of owner-occupied housing falls to 19.3 percent ($411 billion of $2,129billion) in the year of reform, and then gradually increases to 22.1 percent ($533 billion of $2,414 billion) by the fifth year after reform. The investment share of owner-occupied housing is 22.1 percent in the long run.

By comparison, the share of rental (multifamily) housing investment as a share of total fixed investment is roughly constant in response to reform. The investment share of rental housing is 8.1 percent ($167 billion of $2,077 billion) in the base year under the income tax. It increases to 8.9 percent ($189 billion of $2,129 billion.) in the year of reform, and then gradually declines to 8.1 percent.

To summarize, the increase in investment in the nonresidential and rental housing sectors and the initial decline in investment in the owner-occupied housing sector occur for two reasons. First, eliminating the tax on the normal rate of return to investment as well as a gradual decline in interest rates reduces the cost of capital and thus increases 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 nonresidential and rental housing sectors, and thus also increases investment in these sectors.

One of the economic benefits of fundamental tax reform in the form of implementing a consumption-based tax like the national retail sales tax described in H.R. 25 is a more efficient allocation of capital across the residential and nonresidential sectors.[31] The capital stocks in the nonresidential and rental housing sectors increase in every year after reform in relation to the initial steady state. Five years after the reform is enacted, the capital stock in the nonresidential sector is 3.5 percent larger and the capital in the rental housing sector is 2.4 percent larger. Capital in the nonresidential and rental housing sectors increases by 8.9 and 7.6 percent, respectively, in the long run steady state. By comparison, in the owner-occupied housing sector, the stock of capital declines in relation to the initial steady state, as capital is reallocated from owner-occupied housing to the rental housing and nonresidential sectors. Five years after the reform is enacted, the capital stock in the owner-occupied housing sector is 2.0 percent smaller than in the initial steady state. However, in the long run, the overall increase in investment

[31] Note, however, that this argument ignores any of the external benefits to the consumption of owner-occupied housing described above.

attributable to the enactment of a consumption tax implies that the capital stock in the owner-occupied housing sector is only 0.1 percent smaller in the long run steady state. In the long run steady state, the share of the capital stock in the owner-occupied housing sector falls from 40.5 percent to 38.5 percent. The share of nonresidential capital increases from 46.1 percent to 47.8 percent and the share of rental housing capital increases modestly from 13.4 percent to 13.7 percent.

### B. Effects on Business Equity Prices and Housing Values

As discussed above, the transition to a consumption tax raises some interesting and potentially problematic issues. Some observers have argued that, in the absence of special transition rules, the windfall losses experienced by the owners of corporate equity and owner-occupied housing would be sufficiently large to make the enactment of a consumption-based tax reform like H.R. 25 politically infeasible. Others have countered that such windfall losses would be desirable, because they would act to offset the reduction in progressivity associated with implementing a national retail sales tax, attributable to reducing the marginal tax rates on the wealthy and eliminating the taxation of the normal returns to capital. Yet others have concluded that these transitional problems are overstated, and that the enactment of a consumption tax reform would have little effect—or might even increase—the values of business assets and owner-occupied housing. In this section, we examine the effect of enacting H.R. 25 on asset values within the context of the Tax Policy Advisers model.

Table 7 shows the effects of implementing H.R. 25 with moderate adjustment costs (the marginal adjustment cost parameter is 5.0) if there are no transition rules other than the deduction of inventory over a two-year period as described in H.R. 25. In this case, the average value of equity in the nonresidential production sector (average Q) decreases by 14.6 percent in the year of reform and by 18.0 percent in the long run. The average value of equity in the rental housing sector (where remaining basis is relatively large) decreases by 25.7 percent in the year of reform and by 25.8 percent in the long run.

The imposition of H.R. 25 on new housing investment would increase the nominal price of new housing in tandem with the increase in the price of other consumption goods. Thus, the change in

the real price of new housing is ambiguous and must be determined in relation to the amount of other housing and nonhousing consumption goods that are equal in value to a new house. Arbitrage within the housing market implies that the value of existing housing, both in nominal and real terms, is closely related to the value of new housing. The effects of reform on the average value of owner-occupied housing indicate that home values initially fall by 10.1 percent.[32] However, the decrease in the average value of owner housing dissipates quickly as the average value of housing is 2.6 percent lower than in the initial steady state two years after reform and 1.2 percent lower five years after reform.

Although these results suggest a sizable initial decrease in home values, this reform-induced decline is smaller than those found in some of the studies cited above. In the year of reform, the before-tax interest rate increases by about 0.004 percentage points in our simulations. By comparison, with no change in the before-tax interest rate, CGH predict an average decline in the value of owner-occupied housing of 29 percent, three times the magnitude of our estimate. In contrast, assuming no change in the before-tax rate of interest, BHE estimate that nominal house values would increase by 10 percent in the year of reform, which translates to a 5.9 percent decline in real house values given that the price level increases by 17 percent in their model, roughly 60 percent of the decline predicted in our simulations. Thus, our estimates suggest that reform-induced declines in the prices of owner occupied housing would be significant in the year of reform but modest thereafter, generally consistent with the conjectures of Hall (1997) and Gravelle (1996).[33] Moreover, the decline in the average value of owner-occupied housing is temporary, as it dissipates quickly after the enactment of reform and disappears within ten years, which is roughly similar to the results presented by Bruce and Holtz-Eakin (1999).

On the other hand, the declines in the values of rental housing, where rents are fully taxed with no deductions or credits for remaining basis, are relatively large and do not dissipate over time.

[32] 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 FairTax.

[33] Note, however, that these are average figures and thus do not capture the variation in housing price changes that would occur in different regions of the country; in particular, one would expect larger housing price declines in areas that have experienced recent rapid growth in housing prices and have homes that are owned predominantly by

This suggests that, even though most discussion of transitional issues in the housing market has focused on owner-occupied housing, the transitional problems are most severe—and thus the case for transition relief is strongest—in the rental housing sector.

### C. Effects on Other Variables (Off-Model Calculations)

Finally, we provide some admittedly rough "off-model" calculations of the effects of implementation of H.R. 25 on several key housing industry variables. As in all of the analysis, we assume that the initial equilibrium reflects 2006 data.

*Housing Starts*

Housing construction starts—defined as beginning the foundation for a home—are an important indicator of the strength of the residential housing market. Real residential investment and construction starts are highly correlated, which is evident from the high correlation coefficient (0.976) for real residential investment and total construction starts from 1990 to 2006.[34] Given this close relationship, we assume that the changes in housing starts for single-unit housing attributable to enactment of H.R. 25 are proportional to the changes in real investment in the owner-occupied housing sector in the model, and that the changes in housing starts for multi-unit housing are proportional to the changes in real investment in the rental housing sector. In the initial equilibrium, single-unit housing starts are assumed to equal their average value in 2006 of 1.478 million, and multi-unit housing starts are assumed to equal their average value in 2006 of 0.341 million.[35] The implied time paths of single-unit housing starts, multi-unit housing starts and total housing starts are shown in Table 8.

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individuals in relatively high tax brackets

[34] Author's calculation using NIPA data (Table 5.6.3) on real housing investment and census data on housing starts (Department of Commerce, Bureau of the Census, Table B-56, New Private Housing Units Started, Authorized, Completed and Houses Sold, 1959-2006).

[35] Source: Department of Commerce, Bureau of the Census, Table B-56, New Private Housing Units Started, Authorized, Completed and Houses Sold, 1959-2006.

**Table 8.**
**Effects of H.R. 25 on Housing Starts (millions)**

| | IE | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| 1-unit | 1.478 | 1.203 | 1.334 | 1.400 | 1.457 | 1.510 | 1.559 |
| >1-unit | 0.341 | 0.385 | 0.392 | 0.394 | 0.403 | 0.410 | 0.418 |
| Total | 1.819 | 1.588 | 1.726 | 1.794 | 1.860 | 1.920 | 1.977 |

These results suggest that implementing H.R. 25 would reduce total construction starts by 13 percent—from 1.819 to 1.588 million units—in the year of reform. Total construction starts would then gradually increase to 1.794 (1.977) million units two (five) years after the reform. As expected, the tax on new investment in owner-occupied housing would decrease the number of single family construction starts. Single family construction starts would fall from 1.478 to 1.203 million units (by 18.6 percent) in the year of reform, and then gradually increase to 1.400 (1.559) million units two (five) years after the reform. By contrast, multifamily construction starts would increase from 0.341 million units to 0.385 million units (12.9 percent) in the year of reform, and then gradually increase to 0.394 (0.418) million units two (five) years after the reform.

*Homeownership Rate*

The homeownership rate has risen from 63.9 percent to 68.8 percent over the period from 1990 to 2006. However, the increase was preceded by a twenty-five-year period, from 1965 to 1990, over which the homeownership rate was roughly constant, fluctuating between 63.3 percent and 65 percent. Explanations for the recent increase in the homeownership rate include factors such as demographic changes and innovations in financial markets, which our model does not capture, as well as real income growth and the effects of taxation on the homeownership rate, which are captured in the model. From 1960 to 2006, the homeownership rate is positively correlated with the share of owner-occupied housing output in total housing output, with a coefficient of correlation equal to 0.9.[36] Given this, we assume that the changes in the homeownership rate in

[36] Author's calculation using census data (Department of Commerce, Bureau of the Census, Housing Vacancies and Homeownership, Table 12, Homeownership Rates by Area, 1960-2006.) and NIPA data on housing output (Table

response to the implementation of H.R. 25 are proportional to changes in the ratio of output in the owner-occupied housing sector to total output in the owner-occupied and rental housing sectors. In the initial equilibrium (IE), the homeownership rate is assumed to equal its 2006 value of 68.8 percent.[37] The implied time path of the homeownership rate (HO Rate) is shown in Table 9.

**Table 9**

**Effects of H.R. 25 on the Homeownership Rate**

| | IE | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | LR |
|---|---|---|---|---|---|---|---|---|
| HO Rate | 0.688 | 0.688 | 0.686 | 0.685 | 0.683 | 0.682 | 0.681 | 0.676 |

The enactment of H.R. 25 thus causes the homeownership rate to gradually decline as the demand for housing falls. Demand for owner-occupied housing decreases because of the elimination of the tax on normal returns to capital in the nonresidential and rental housing sectors (which reduces the relative tax advantage of owner-occupied housing) and the elimination of the tax deductions for mortgage interest and property taxes. Note that under H.R. 25 all consumption goods are treated roughly the same since most nonresidential consumption is taxed, rental housing payments are taxed, and the tax on new investment in the owner-occupied sector is roughly equivalent to a front-loaded or prepaid tax on the flow of housing services from such investment; only housing services from existing, owner-occupied housing are untaxed. As a result, there is no preferential tax treatment of new investment in owner-occupied housing under H.R. 25. Because of this, a portion of the investment in owner-occupied housing that would have occurred under the income tax is shifted to the nonresidential and rental housing sectors. Rental capital as a share of the total capital stock increases from 13.4 percent to 13.7 percent in the long run and the output of rental housing as a share of total housing output increases from 24.9 to 26.2 percent. This decreases the real price of rental housing services as the stock of rental housing increases, which makes renters better off.

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7.4.5).

[37] Source: Department of Commerce, Bureau of the Census, Housing Vacancies and Homeownership, Table 12, Homeownership Rates by Area, 1960-2006.

*New and Existing Home Sales*

The effects of the implementation of H.R. 25 on new home sales are assumed to be proportional to the changes in investment in the owner-occupied housing sector in the model. Time series data show that new and existing home sales track each other very closely on an annual basis, with a value for R-squared equal to 0.87.[38] (However, note there can be substantial differences in new and existing home sales in monthly data since new home sales are counted when the contract is signed and existing home sales are counted at closing, which is generally one to two months after the contract is signed.) Given this close correlation, we assume both existing and new home sales are proportional to investment in owner-occupied housing. In the initial equilibrium, new and existing home sales are assumed to equal their 2006 value of 7.531 million, which is comprised of 1.053 million new home sales (14 percent of the total) and 6.478 million existing home sales.[39] The implied time path of new and existing home sales is shown in Table 10.

**Table 10**

**Effects of the Fair Tax on New and Existing Home Sales (millions)**

| | IE | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| New Sales | 1.053 | 0.857 | 0.932 | 0.959 | 0.978 | 0.993 | 1.006 |
| Existing Sales | 6.478 | 5.272 | 5.731 | 5.898 | 6.014 | 6.110 | 6.188 |

The enactment of H.R. 25 thus has significant effects on home sales, as new home sales fall initially from 1.053 to 0.857 million and sales of existing homes fall from 6.478 to 5.272 million. Note that implementing H.R. 25 is not likely to have dramatically different effects on new and existing home sales. The decrease in the demand for owner-occupied housing leads to both a decrease in investment in new housing, and thus a decline in new home sales, and a decrease in the demand for existing housing (including a decrease in the optimal size of a house). However, owners of existing houses are unlikely to adjust the size of their house due to the existence of

[38] Source: http://calculatedrisk.blogspot.com/2007/03/new-vs-existing-home-data.html

[39] Source: National Association of Home Builders, Economic and Housing Data, Housing Industry Data, Home Sales and Prices, New and Existing Home Sales, U.S.

significant transaction costs.

*Home Builders*

Implementing H.R. 25 would decrease the tax burden on homebuilders, which would act to increase after-tax profits, but it would also reduce revenues and thus profits as the demand for new owner-occupied housing declines. Under the income tax, a dollar in corporate (noncorporate) profit is taxed at an effective tax rate of 28.8 (20.5) percent, leaving $0.612 ($0.715) to distribute to the owners of the firm to purchase consumption goods (or save for future consumption) with a base year composite good price of $1.00. (Note that this simple example ignores the double taxation of corporate income.) After enactment of H.R. 25, corporate (noncorporate) profits would not be taxed, so the owners of the firm would receive $1.00; however, the price of consumption goods would increase to $1.383 inclusive of the sales tax. Thus, the owners of the firm can afford to purchase 0.72 units of the consumption good. In this example, a dollar in after-tax corporate (noncorporate) profit increases in value by 1.0 percent, while a dollar of noncorporate profit decreases by 4.0 percent. This example illustrates the potential for disparity in the effects of H.R. 25 on corporate and noncorporate firms. For the most part, corporate and noncorporate homebuilders would be treated similarly under H.R. 25. The main sources of disparity would be the differences under the income tax between the corporate and individual effective income tax rates and the double taxation of corporate income. This example also ignores the reduction in demand for housing that would accompany the implementation of H.R. 25. The net impact of these two effects on after-tax profits is illustrated in Table 11, which presents a highly stylized and simple example of the effects of the reform on a hypothetical homebuilder. We derive revenue from the implied decline in the quantity of new home sales shown in Table 10 and assume that costs are a constant fraction of revenue, which may not be the case (note that administrative costs related to income tax record keeping may fall after reform). The average effective tax rate in the corporate sector of 28.8 percent is used to calculate after-tax profits in the initial equilibrium (IE).

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http://www.nahb.org/fileUpload_details.aspx?contentID=55761

**Table 11**

**Effects of the Fair Tax on Home Builders After-tax Profits ($millions)**

| Real Values | IE | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|
| Revenue | 10,000 | 6,463 | 7,036 | 7,310 | 7,427 | 7,542 | 7,629 |
| Costs | 9,400 | 6,075 | 6,613 | 6,871 | 6,982 | 7,089 | 7,172 |
| Gross Profit | 600 | 388 | 422 | 439 | 445 | 453 | 457 |
| Taxes | 173 | 0 | 0 | 0 | 0 | 0 | 0 |
| After-tax Profits | 427 | 388 | 422 | 439 | 445 | 453 | 457 |

The estimates in Table 11 are reported as real values. For example, home builders nominal revenues of $8.938 billion in the year of reform are adjusted for the 38.3 percent increase in the general price level caused by the implementation the sales tax under H.R. 25, which yields a value for real revenues in the year of reform equal to $6.463 billion ($8.938/(1+0.383)). This implies that corporate homebuilders' after-tax profits would decline once the effect of including the decline in demand for new construction starts of implementing H.R. 25 is considered. Noncorporate homebuilders (taking into account individual level taxation in this case) would fare even worse after accounting for the decline in the demand for new construction from the enactment of H.R. 25. Note that in the long run, adjustments in the allocation of capital across industries will completely mitigate any above normal returns or losses across production sectors.

## VI. Conclusion

This report examines the macroeconomic and transitional effects of implementing a specific type of consumption tax reform—the national retail sales tax known as the FairTax, as specified in H.R. 25—with a focus on the effects of such a reform on the housing sector, including reform-induced reductions in the prices of existing housing. The analysis is conducted within the context

of a dynamic overlapping generations computable general equilibrium model that includes a corporate sector that produces a nonresidential composite good as well as noncorporate rental housing and owner-occupied housing production sectors and allows for the costs of adjusting all capital stocks in response to the enactment of the reform.

Our results indicate that such a reform would generate significant overall macroeconomic improvement in both the short and long runs, reflecting the labor supply and savings responses to lower overall tax rates on labor income and the elimination of the taxation of normal returns to capital income (a marginal effective tax rate of zero on the income earned by new investment). In particular, the model simulation results indicate that GDP would increase by 3.8 percent in the long run, reflecting a 2.9 percent in labor supply and a 5.3 increase in overall investment. However, the implementation of such a reform would raise some significant transitional issues, especially in the housing sector. These can be grouped into effects on the owner-occupied housing sector and the rental housing sector.

With respect to the owner-occupied housing sector, the enactment of H.R. 25 would put downward pressure on the prices of existing housing because investment in housing would no longer be tax-favored (due to the absence of income taxation of imputed rents on such investment) and deductions for home mortgage interest and property taxes would be eliminated. Investment in new owner-occupied housing would be taxed as a proxy for taxing the future housing services provided by such investment, although no attempt would be made to tax the housing services attributable to existing owner-occupied housing (which implies that the prices of existing housing would decline by significantly less than if such services were taxed). The enactment of H.R. 25 would increase the price of housing services, but only modestly—by 1.0 percent in the year of reform, by 4.2 percent five years after enactment, and by 3.0 percent in the long run. But much larger effects would occur, at least initially, for the values of existing housing, which would change by the capitalized values of changes in future explicit and implicit cash flows. In particular, the simulations suggest that the prices of existing homes would fall by 10.1 percent in the year of enactment of H.R. 25, although this effect would dissipate rather quickly, with declines of only 2.6 percent two years after reform, 1.2 percent five years after enactment, and no effect in the long run. These results suggest that concerns about a collapse of

housing prices in response to the enactment of H.R. 25 may be misplaced.

In the rental housing sector, the model simulation results suggest that real rents would decline somewhat, by 1.0 percent two years after enactment, by 2.4 percent five years after enactment, and by 7.1 percent in the long run, reflecting the relatively generous treatment of investment in rental housing in comparison to that under the income tax. However, the effects on the values of existing rental housing would be dramatic and persistent. In particular, the real value of existing rental housing would decline by 25.7 percent in the year of enactment of reform, and this decline would remain roughly constant, with a long run decline of 25.8 percent. These declines arise because investments in rental housing were made on the assumption of continued depreciation deductions under the income tax, but these deductions disappear under the sales tax while rents are fully taxed under the new regime. This suggests that, even though most discussion of transitional issues in housing markets has focused on owner-occupied housing, the transitional problems are much more severe—and thus the case for transition relief is much stronger—in the rental housing sector.

The enactment of H.R. 25 would also cause dislocations in the homebuilding industry. Investment in owner-occupied housing would fall initially by 18.6 percent, and would still be 4.5 percent lower five years after reform, although it would eventually return to pre-reform levels. In marked contrast, however, investment in rental housing, which would benefit from the elimination of the corporate income tax, would increase by 12.7 percent in the year of enactment, would still be 8.0 percent higher five years after enactment, and would increase by 8.9 percent in the long run. These increases in rental housing investment would moderate the negative effect on homebuilders of the decline in investment in owner-occupied housing.

In terms of homebuilder profits, the net effect of implementing H.R. 25 is that real after-tax profits would decline. The decline in after-tax profits would be larger for noncorporate homebuilders than for corporate homebuilders. Other corporate firms whose profits are not closely tied to the housing construction and that are currently subject to high effective tax rates would experience net gains from the enactment of H.R. 25, because they would not experience the decline in profits associated with the decrease in new housing demand but would benefit

from moving away from a tax system with a high effective corporate income tax rate.

In closing, we offer a few caveats. Perhaps most important, it must be remembered in interpreting our results that that our model depicts the effects of the implementation of a consumption-based tax reform like H.R. 25 on a highly aggregated representation of the housing sector. As a result, the average effects on housing simulated in the model and described above may very well mask significantly larger swings in asset values for certain types of housing and on homes in certain regions. In particular, negative effects of implementing H.R. 25 on housing prices would be more likely to be felt by high-income households who own large homes, itemize deductions and face relatively high marginal personal income tax rates, especially if they live in states with relatively high property taxes. Brady, Cronin, and Houser (2003) find that these household characteristics vary systematically across regions; for example, their results suggest that many households on the East and West Coasts share many of these characteristics and thus might suffer disproportionately large losses from the enactment of the FairTax. Our aggregate model clearly does not capture such regional effects.[40]

More generally, our analysis has been conducted within the framework of a single representative individual in each generation. An additional critical issue is the distribution of the effects of reform across lifetime income groups within each generation, taking into account differences in investment patterns across income groups, especially since lower and middle income groups hold disproportionately large shares of their investment portfolios in owner-occupied housing relative to upper income groups and the relative importance of tax-deferred assets varies across income groups. Moreover, the model, like any highly stylized representation of the complex U.S. economy, could of course be extended in many ways, e.g., to include alternative models of individual behavior, to allow variation in certain parameters such as the debt-capital ratio in response to reform, to consider different parameter values, and to incorporate international trade and imperfectly competitive markets in some production sectors. These topics are the focus of ongoing research.

[40] In addition, note that speculative bubbles do not occur in our model, which thus does not capture the housing price increases—and the potential for huge declines—associated with such bubbles.

## Appendix

This appendix provides a more detailed description of the model utilized in this report. A complete description is provided in Diamond and Zodrow (2005).

### A. The Nonresidential Production Sector

In each period *s*, corporate firms in the nonresidential production sector produce output ($X_s$) using capital $K_s^X$ and labor $L_s^X$ using a CES production function with an elasticity of substitution in production $\sigma_X$ and a capital share parameter $a_X$. Firms are assumed to choose the time path of investment to maximize the present value of firm profits or, equivalently, maximize firm value $V_X$, net of all taxes. In the initial income tax equilibrium, firms are subject to a corporate income tax and state and local property taxes, with the former eliminated under H.R. 25 so that all terms related to the corporate income tax disappear. Total taxes in the nonresidential composite good production sector in period *s*, are

$$T_s^X = \tau_{bs}^X \left[ p_s^X X_s - w_s L_s^X - \Phi_s^X I_s^X - f_{IT} i_s B_s^X - f_{IT} \delta_\tau^X K_{\tau s}^X \right] + (1 - \tau_{bs}^X) \tau_{ps}^X K_s^X ,$$

where $\tau_{bs}$ is the corporate income tax rate on business income in the nonresidential sector, $p_s^X$ is the price of the nonresidential composite good, $w_s$ is the wage rate, $I_s^X$ is gross investment, $\Phi_s^X$ are adjustment costs per unit of investment which are deductible against the income tax, $i_s$ is the before-tax interest rate, $B_s^X$ is total firm indebtedness, $\delta_{\tau s}^X$ is depreciation for tax purposes, $K_{\tau s}^X$ is the remaining tax basis of the capital stock, $\tau_{ps}^X$ is the property tax rate on both composite good sector and nonresidential capital, with property taxes assumed to be fully deductible against the business income tax, and $f_{IT}$ is one under the income tax and zero otherwise.[41] Under H.R. 25, receipts on consumption goods and services are subject to the sales tax and no deductions (other than the transitional two-year inventory credit) are allowed. Following Goulder and Summers (1989) and Cummins, Hassett, and Hubbard (1994), the adjustment cost function per unit of investment is assumed to be a quadratic function of gross investment per unit of capital in excess of the steady state level, or

[41] That is, depreciation and interest expense are deductible under the income tax. The property tax on businesses is treated as a tax on capital rather than a benefit tax (Muthitacharoen and Zodrow, 2006).

$$\Phi_s\left(\frac{I_s^X}{K_s^X}\right) = \frac{p_s^X(\beta^X/2)(I_s^X/K_s^X - \mu^X)^2}{I_s^X/K_s^X},$$

where $\beta^X$ is the parameter that determines the level of adjustment costs and $\mu^X$ is set so that adjustment costs are zero in the steady state.

Assuming firms do not make any financial investments, total net cash receipts, including net new bonds issued $B_s^X$ and net new shares issued $VN_s^X$, must either be used to finance new investments (including adjustment costs) or distributed to shareholders

$$[p_s^X X_s - w_s L_s^X - i_s B_s^X] - T_s^X + BN_s^X + VN_s^X = I_s^X\left(1+\Phi_s^X\right) + DIV_s^X,$$

where $DIV_s^X$ is the dividend payout in the nonresidential composite good sector. Each firm is assumed to maintain a fixed debt/asset ratio $b^X$ and pay out a constant fraction of earnings after taxes and depreciation in each period. This implies that new investments are financed with debt and new share issues if retained earnings are insufficient to finance the desired level of investment.

The model assumes individual level arbitrage, which implies that the after-tax return to bonds must equal the after-tax return received by the shareholders of the firm, or

$$\left(1-\tau_{bs}^X\right)i_s = \frac{\left(1-\tau_{ds}\right)DIV_s^X + \left(1-\tau_{gs}\right)\left(V_{s+1}^X - V_s^X - VN_s^X\right)}{V_s^X},$$

where $\tau_{is}$ is the average marginal personal income tax rate on interest income, $\tau_{ds}$ is the average marginal tax rate on dividends, and $\tau_{gs}$ is the average effective annual accrual tax rate on capital gains $\left(V_{s+1}^X - V_s^X - VN_s^X\right)$. These individual income taxes also disappear under H.R. 25. Solving this expression for $V_s^X$, subject to the transversality condition requiring a finite value of the firm, yields

$$V_s^X = \sum_{u=s}^{\infty} \frac{\left[\left(1-\tau_{du}\right)/\left(1-\tau_{gu}\right)\right]DIV_u^X - VN_u^X}{\prod_{v=s}^{u}\left[1+(1-\tau_{iu})i_u/(1-\tau_{gu})\right]},$$

That is, the value of the corporate firm in the nonresidential composite good sector equals the

present value of all future net distributions to the owners of the firm. The time path of investment that maximizes this expression in the presence of adjustment costs is

$$\frac{I_s^X}{K_s^X} = \frac{q_{s+1}^X - 1 + b^X + f_{FT}\Omega_s^X \tau_{bs} + f_{IT} Z_{s+1}^X}{p_s^X \beta^X \left(1 - \tau_{bs}\Omega_s^X\right)},$$

where $q_{s+1}^X$ is shadow price of additional capital (commonly referred to as 'marginal q' which equals the ratio of the market value of a marginal unit of capital to its replacement cost), $\Omega_s^X$ is a weighted average of the dividend and capital gains tax rates divided by one minus the capital gains tax rate, and $Z_{s+1}^X$ is the tax savings from accelerated depreciation allowances on future investments.

The relationship between 'marginal q' and 'average q' (denoted as $Q_s^X$) is

$$q_s^X = \frac{V_s^X - X_s^X}{K_s^X} = Q_s^X - \frac{X_s^X}{K_s^X},$$

where $X_s^X$ is the value of future depreciation deductions on the existing stock of capital used in the production of the composite good.

**B. The Owner-Occupied and Rental Housing Production Sectors**

Housing is produced in the owner-occupied and rental housing production sectors where, following Goulder and Summers (1989) and Goulder (1989), rental housing is produced by noncorporate landlords and owner-occupied housing is produced by the owners, who then "rent" housing services to themselves. The technology used in the production of rental housing ($R_s$) and owner-occupied housing ($O_s$) is assumed to be identical—capital and labor combined in a CES production function with an elasticity of substitution in production of $\sigma_H$ and a capital share parameter of $a_H$.[42] Landlords and owner-occupiers are also are assumed to choose time paths of investment to maximize the equivalent of firm value, net of total taxes.

[42] However, rental and owner-occupied housing services are not perfect substitutes, so that the mix of rental and owner-occupied housing services changes along the transition path to a new equilibrium.

*The Rental Housing Sector*

In the case of the rental housing sector, the firm is modeled as a noncorporate firm. This implies that under the income tax landlords are taxed at the individual level, so total taxes paid are

$$T_s^R = \tau_{bs}^R \left[ p_s^R R_s - w_s L_s^R - \Phi_s^R I_s^R - f_{IT} i_s B_s^R - mK_s^R - f_{IT} \delta_\tau^R K_{\tau s}^R \right] + (1 - \tau_{bs}^R) \tau_{ps}^R K_s^R,$$

where $\tau_{bs}^R$ is the average marginal tax rate applied to rental housing income,[43] $m$ is annual maintenance expenditures per unit of rental housing capital, and the definitions of all other variables are analogous to those in the non-residential composite good production sector. As discussed in the text, under H.R. 25, rents (but not investment costs) are subject to the sales tax and no expenses are deductible. Solving the cash flow equation in the rental housing sector for after-tax rents received by landlords $S_s^R$ yields

$$S_s^R = p_s^R F_s^R(\cdot) - w_s L_s^R - i_s B_s^R - mK_s^R - T_s^R + BN_s^R + E_s^R - I_s^R (1 + \Phi_s^R),$$

where $E_s^R$ is net new equity invested by landlords in the rental housing sector. Individual arbitrage in this case implies

$$(1 - \tau_{is}) i_s = \frac{S_s^R + (1 - \tau_{gs})(V_{s+1}^R - V_s^R - E_s^R)}{V_s^R}$$

which can be solved for the value of the rental housing firm

$$V_s^R = \sum_{u=s}^{\infty} \frac{\left[1/(1 - \tau_{gu})\right] S_s^R - E_s^R}{\prod_{v=s}^{u} \left[1 + (1 - \tau_{iu}) i_s / (1 - \tau_{gu})\right]}.$$

The time path of investment that maximizes this expression in the presence of adjustment costs is

$$\frac{I_s^R}{K_s^R} = \frac{q_{s+1}^R - \Omega_s^R + b^R \Omega_s^R + f_{FT} \Omega_s^R \tau_{bs}^R + f_{IT} Z_{s+1}^R}{\mathrm{p_s} \Omega_s^R \beta^R (1 - \tau_{bs}^R)}.$$

The expression for relationship between 'marginal q' and 'average q' in the rental housing sector is analogous to that in the composite good sector.

[43] The tax rate on rental housing income is a weighted average of the noncorporate tax rate on landlord profits and the corporate tax rate. The weight is determined by the share of rental housing produced in the corporate sector, which is equal to 10 percent.

*The Owner-Occupied Housing Sector*

By comparison, in the owner-occupied housing sector, since imputed rents are untaxed and maintenance expenditures are not deductible while mortgage interest and property taxes are deductible under the income tax, total taxes are

$$T_s^O = -z_s \tau_{is} i_s B_s^O + (1 - z_s \tau_{is}) \tau_{ps}^O K_s^O ,$$

where $z_s$ is the fraction of individuals who are itemizers. Under H.R. 25, investment costs are also subject to the sales tax (as a proxy for the taxation of future owner-occupied housing services). The flow of (untaxed) imputed rents to owner-occupiers is

$$S_s^O = p_s^O F_s^O - w_s L_s^O - i_s B_s^O - T_s^O - mK_s^O + BN_s^O + E_s^O - I_s^O (1 + \tau + \Phi_s^O)$$

The expressions for individual level arbitrage and firm value are analogous to those in the rental housing sector, and investment in the owner-occupied sector is

$$\frac{I_s^O}{K_s^O} = \frac{q_{s+1}^O - \Omega_s^O + b^O \Omega_s^O}{\mathrm{p_s} \Omega_s^O \beta^O}.$$

The expression for relationship between 'marginal q' and 'average q' in the owner-occupied housing sector is analogous to that in the non-residential composite good sector.

**C. Individual Behavior**

On the individual side, the model has a dynamic overlapping generations framework with fifty-five generations alive at each point in time. There is a representative individual for each generation, who has an economic life span (which begins upon entry into the work force) of fifty-five years, with the first forty-five of those years spent working, and the last ten spent in retirement. Individual tastes are identical, so that differences in behavior across generations are due solely to differences in lifetime budget constraints. An individual accumulates assets from the time of "economic birth" that are used to finance both consumption over the life cycle, especially during the retirement period, and the making of bequests. The model follows Fullerton and Rogers (1993) in including a relatively primitive "target model" of bequests, with the real values of bequests assumed to be fixed and thus unaffected by changes in economic conditions, including changes in income. Inheritances are assumed to be received at the economic age of twenty-five.

At any point in time *s*, the consumer maximizes rest-of-life utility $LU_s$ subject to a lifetime budget constraint that requires the present value of lifetime wealth including inheritances to equal the present value of lifetime consumption including bequests. In particular, an individual of age *a* at time *s*=*t* chooses the time path of consumption of an aggregate consumption good and leisure in each period *s* to maximize rest-of-life utility

$$LU_s = \frac{\sigma}{\sigma - 1} \sum_{s=t}^{t+54-a} \frac{U_s(a)^{\left(1-\frac{1}{\sigma}\right)}}{(1+\rho)^{s-t}},$$

where $\sigma$ is the intertemporal elasticity of substitution, ris the rate of time preference, and $U_s(a)$ is assumed to be a CES function of consumption of the aggregate consumption good and leisure in period *s* with an intratemporal elasticity of $\varepsilon$ and a leisure share parameter of $a_E$. The aggregate consumption good is modeled as a CES function of the nonresidential composite good and aggregate housing services, with aggregate housing services in turn modeled as CES function of owner-occupied and rental housing services. In addition, as described in detail in Diamond and Zodrow (2005), the model includes exogenous population and technology growth rates, a simple social security system, government purchases of the composite good, transfer payments, a hump-backed wage profile over the life cycle, and, under the income tax, a progressive tax on wage income, and constant average marginal tax rates applied to interest income, dividends, and capital gains. Under H.R. 25, a large fraction of consumption expenditures is subject to sales taxation, with the fraction reflecting the various factors described in detail in Section II, including the exemption of housing services on owner-occupied housing capital existing at the time of reform, the exemption of educational expenditures, and the taxation of financial intermediation services, as well as receipt of the FairTax prebate.

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**Table 1**

**Alternative Static Approaches to Calculating the Tax Rate Under H.R. 25**

| | Both Bases | K-Base | G-Base | DZ-Base |
|---|---|---|---|---|
| **For Reference: Aggregate Output and Consumption** | | | | |
| Gross Domestic Product (2006) | 13,194.7 | | | |
| Personal consumption expenditures (2006) | 9,224.5 | | | |
| Note: PCE in 2007 estimated for K-Base | | 9,772.0 | | |
| Ratio of actual PCE in 2006 to K-Base estimate, used to adjust K-Base figures to 2006 | | 0.944 | | |
| Note: PCE in 2003 estimated for G-Base | | | 7760.9 | |
| Ratio of actual PCE in 2006 to G-Base estimate, used to adjust G-Base figures to 2006 | | | 1.189 | |
| Actual PCE in 2005 | | | 8,708.8 | |
| Ratio of actual PCE in 2006 to PCE in 2005, used to adjust K-Base figures to 2006 | | | 1.059 | |
| | | | | |
| **REVENUES TO BE REPLACED** | | | | |
| Individual income taxes (NIPA Table 3.2, Line 3 - hereafter, 3.2/3) | 1,053.2 | | | 1,053.2 |
| Corporate income taxes, other than from Federal Reserve banks (3.2/9) | 344.0 | | | 344.0 |
| Corporate income taxes on Federal Reserve banks (3.2/8) | | 29.1 | 0 | 0.0 |
| Social insurance and retirement receipts (3.2/11) | 901.6 | | | 901.6 |
| Estate and gift taxes (3.2/38) | 27.8 | | | 27.8 |
| Earned income credit and child tax credit (0.94*Kotlikoff 2007 estimate) | | -48.9 | 0 | 0 |
| IRS savings | | -8.0 | 0 | 0 |
| Administrative costs (0.25% of revenues) | | 5.7 | 0 | 0 |
| *Revenues to be Replaced or R-S* | | **2,304.6** | **2,326.6** | **2326.6** |

| | Both Bases | K-Base | G-Base | DZ-Base |
|---|---|---|---|---|
| **PRIVATE CONSUMPTION TAX BASE** | | | | |
| Personal consumption expenditures (2.4.5/1) | 9,224.5 | | | 9,224.5 |
| ***Special treatment of housing*** | | | | |
| Purchases of new homes (5.4.5B/36; K takes 0.794) | | 372.4 | 469.0 | 372.4 |
| Purchases of manufactured (mobile) homes (5.4.5B/40) | 7.4 | | | 7.4 |
| Purchases of dormitories (5.4.5B/41) | | 0.0 | 2.1 | 2.1 |
| Home improvements (5.4.5B/42) | 178.5 | | | 178.5 |
| Brokers' commissions on housing (services) (5.4.5B/43) | 101.5 | | | 101.5 |
| Net purchases of used structures (5.4.5B/44) | | 0.0 | -3.4 | 0.0 |
| Less: Imputed rent on owner-occupied housing (2.4.5/49) | -1,014.5 | | | -1,014.5 |
| Less: Imputed rent on farm dwellings (2.4.5/51) | -14.8 | | | -14.8 |
| ***Special treatment of education*** | | | | |
| Less education expenditures (2.4.5/94) | | -210.05 | -239.6 | -239.6 |
| ***Special treatment of financial services and financial intermediation*** | | | | |
| Plus: Taxable home mortgage interest (Sheet 2, B5) | 143.3 | | | 143.3 |
| Plus: Taxable non-profit interest (Sheet 2, B13) | 4.3 | | | 4.3 |
| Plus: Taxable personal interest (Sheet 2, B20) | 148.7 | | | 148.7 |
| Plus: Imputed services on demand deposits, other checkable deposits (Sheet 2, B28) | 0.0 | | | 23.4 |
| ***Treatment of non-residents and US citizens traveling abroad*** | | | | |
| Plus: Expenditure in US by non-residents (2.5.5/112) | 109.9 | | | 109.9 |
| Less: Expenditures abroad by US residents (nondurables) (2.5.5/111) | -8.0 | | | -8.0 |
| Less: Foreign travel by US residents (services) (2.5.5/110; 50%) | | -54.4 | -108.7 | -108.7 |
| ***Other*** | | | | |
| Less: Food produced and consumed on farms (2.5.5/6) | 0.5 | | | 0.5 |
| Less: State sales taxes (3.3/7; 60%) | | -249.2 | -415.4 | -249.2 |
| Less: Adjustments for non-profit consumption (2003 data, adjusted) | | -9.4 | 0 | 0.0 |
| *Total private consumption tax base or C-P* | | **8,730.5** | **8,585.2** | **8,681.5** |
| *C-P/PCE* | | 94.6% | 93.1% | 94.1% |

| | Both Bases | K-Base | G-Base | DZ-Base |
|---|---|---|---|---|
| **STATE AND LOCAL GOVERNMENT CONSUMPTION TAX BASE** | | | | |
| State and local government consumption expenditures (3.3/22) | 1,276.5 | | | 1,276.5 |
| Less: Capital consumption allowances included as consumption expenditures (3.3/38) | -162.3 | | | -162.3 |
| Plus: Gross purchases of new structures (3.9.5/24) | 260.5 | | | 260.5 |
| Plus: Gross purchases of new equipment and software (3.9.5/25) | 53.6 | | | 53.6 |
| Less: Current education spending (wages and salaries) (K:6.3D/34; G:3.17/28+53-70) | | -371.4 | -582.3 | -582.3 |
| Less: Capital education spending (3.17/124) CORRECTED TABLE PER GALE | | 0.0 | -87.8 | -87.8 |
| *Total state and local government consumption tax base or C-SL* | | **1,056.9** | **758.2** | **758.2** |
| | | | | |
| **FEDERAL GOVERNMENT CONSUMPTION TAX BASE** | | | | |
| Federal government consumption (3.2/20; also 3.9.5/7) | 812.8 | | | 812.8 |
| Less: Capital consumption allowances included as consumption expenditures (3.2/44) | -105.4 | | | -105.4 |
| Plus: Subsidies to business (3.2/31) (Gale includes as transfers) | | 49.4 | 0.0 | 0.0 |
| Gross purchases of new structures (3.9.5/9) | 16.8 | | | 16.8 |
| Gross purchases of equipment and software (3.9.5/10) | 102.9 | | | 102.9 |
| *Total taxable federal government consumption tax base or G-S* | | **876.5** | **827.1** | **827.1** |
| | | | | |
| *Total private and all levels of government consumption tax base* | | 10,663.9 | 10,170.5 | 10,266.8 |
| *Total private and all levels of government consumption tax base as % of GDP* | | 80.8% | 77.1% | 77.8% |
| | | | | |
| **UNTAXED FEDERAL GOVERNMENT SPENDING** | | | | |
| Taxable SS benefits (IRS SOI 1.4/108) (2005 data*1.059)) | | 129.3 | 0.0 | 129.3 |
| *Total untaxed federal government spending or G-O* | | **129.3** | **0.0** | **129.3** |
| | | | | |
| **BASE FOR PREBATE (Sheet 4, D22 )** ***or X*** | | **2,084.4** | **2,084.4** | **2,084.4** |

| | | K-Base | G-Base | DZ-Base |
|---|---|---|---|---|
| **CALCULATION OF TAX-INCLUSIVE TAX RATE** ***[R-S/(C-P+C-SL+GS+GO-X)]*** | | | | |
| ***Kotlikoff tax inclusive rate -- Compare to 23.8% in 2007 Table 5*** | | **26.5%** | | |
| ***Gale tax inclusive rate -- Compare to 27.7% in 2006 Table A.6*** | | | **28.8%** | |
| ***DZ tax inclusive rate*** | | | | **28.0%** |
| | | | | |
| ***Equivalent Kotlikoff tax exclusive rate*** | | **36.0%** | | |
| ***Equivalent Gale tax exclusive rate*** | | | **40.4%** | |
| ***Equivalent DZ tax exclusive rate*** | | | | **38.9%** |
| | | | | |
| ***DZ tax inclusive rate with transitional inventory credit of $92 billion in 2006*** | | | | **29.1%** |
| | | | | |
| **DZ TAX-INCLUSIVE RATE CALCULATIONS WITH BASE REDUCTIONS** | Base change | | | |
| Base DZ tax inclusive rate | | | | **28.0%** |
| Remove only state and local consumption expenditures | -758.2 | | | **30.8%** |
| Remove only new housing investment and rental housing ($277.0 billion) | -658.9 | | | **30.4%** |
| Remove only medical care services (physicians, dentist, other prof serv, hosp/n-home) | -1,438.5 | | | **33.9%** |
| Remove only food purchased for off-premise consumption | -762.6 | | | **30.8%** |

**Table 7**
**Macroeconomic Effects of Enacting H.R. 25**

| | Year | 2006 | 2007 | 2008 | 2011 | 2014 | 2016 | 2021 | 2026 | 2056 | 2106 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | State Sales Tax Rate | 5.4 | 5.3 | 5.2 | 5.2 | 5.1 | 5.1 | 5.0 | 4.9 | 4.8 | 4.8 |
| | National Sales Tax Rate | 38.3 | 37.4 | 36.0 | 36.0 | 35.8 | 35.7 | 35.6 | 35.5 | 35.3 | 35.3 |
| Δ | After-Tax Interest Rate | 0.015 | 0.002 | -0.001 | 0.001 | 0.000 | 0.000 | -0.001 | -0.002 | -0.002 | -0.002 |
| Δ | Before-Tax Interest Rate | 0.004 | -0.009 | -0.012 | -0.010 | -0.011 | -0.011 | -0.012 | -0.013 | -0.013 | -0.013 |
| Δ% | After-Tax Wage Rate | 17.4 | 18.3 | 19.5 | 19.9 | 20.4 | 20.6 | 21.2 | 21.6 | 22.2 | 22.3 |
| Δ% | Before-Tax Wage Rate | -0.5 | -0.4 | -0.2 | 0.1 | 0.3 | 0.5 | 0.7 | 0.9 | 1.1 | 1.1 |
| Δ% | Price of NR Good | -0.2 | -0.2 | -0.4 | -0.4 | -0.5 | -0.5 | -0.6 | -0.6 | -0.7 | -0.7 |
| Δ% | Price of RH Services | -0.1 | -0.7 | -1.0 | -2.4 | -3.4 | -4.1 | -5.2 | -6.0 | -7.1 | -7.2 |
| Δ% | Price of OH Services | 1.0 | 2.2 | 3.1 | 4.2 | 4.6 | 4.6 | 4.3 | 3.9 | 3.0 | 2.9 |
| Δ% | Labor Supply | 2.8 | 2.9 | 3.0 | 3.0 | 3.0 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 |
| Δ% | Investment NR | 8.9 | 8.0 | 7.5 | 8.0 | 8.3 | 8.5 | 8.7 | 8.9 | 8.9 | 8.9 |
| Δ% | Investment RH | 12.7 | 12.7 | 11.0 | 10.9 | 10.5 | 10.4 | 9.8 | 9.2 | 7.7 | 7.6 |
| Δ% | Investment OH | -18.6 | -11.5 | -9.0 | -4.5 | -1.9 | -0.8 | 0.5 | 0.8 | -0.1 | -0.1 |
| Δ% | NR Capital | 0.0 | 1.0 | 1.7 | 3.5 | 4.8 | 5.5 | 6.9 | 7.7 | 8.8 | 8.9 |
| Δ% | RH Capital | 0.0 | 0.6 | 1.1 | 2.4 | 3.4 | 4.0 | 5.3 | 6.1 | 7.5 | 7.6 |
| Δ% | OH Capital | 0.0 | -0.8 | -1.3 | -2.0 | -2.2 | -2.2 | -1.8 | -1.3 | -0.3 | -0.1 |
| Δ% | Average Value of NR Capital | -14.6 | -13.8 | -14.1 | -15.5 | -16.1 | -16.4 | -17.0 | -17.4 | -18.0 | -18.1 |
| Δ% | Average Value of RH Capital | -25.7 | -24.0 | -23.4 | -24.1 | -24.4 | -24.6 | -24.9 | -25.2 | -25.8 | -25.8 |
| Δ% | Average Value of OH Capital | -10.1 | -5.4 | -2.6 | -1.2 | -0.1 | 0.3 | 0.8 | 0.7 | 0.1 | 0.0 |
| Δ% | NR Firm Value | -14.6 | -12.9 | -12.6 | -12.5 | -12.1 | -11.8 | -11.3 | -11.1 | -10.8 | -10.8 |
| Δ% | RH Firm Value | -25.7 | -23.6 | -22.6 | -22.3 | -21.8 | -21.5 | -20.9 | -20.6 | -20.2 | -20.2 |
| Δ% | OH Firm Value | -10.1 | -6.2 | -3.8 | -3.3 | -2.3 | -1.9 | -1.0 | -0.6 | -0.2 | -0.1 |
| Δ% | GDP | 2.1 | 2.3 | 2.6 | 2.9 | 3.1 | 3.2 | 3.4 | 3.6 | 3.8 | 3.8 |
| Δ% | NR Output | 2.3 | 2.5 | 2.7 | 3.0 | 3.3 | 3.4 | 3.6 | 3.8 | 4.0 | 4.0 |
| Δ% | RH Output | 0.0 | 0.6 | 1.1 | 2.3 | 3.4 | 4.0 | 5.2 | 6.1 | 7.4 | 7.5 |
| Δ% | OH Output | 0.3 | -0.5 | -1.0 | -1.7 | -1.9 | -1.9 | -1.4 | -1.0 | 0.0 | 0.2 |

Notation: Δ=change; %Δ=percentage change; NR=non-residential; RH=rental housing; OH=owner-occupied housing.