This study was prepared for the Business Roundtable; for a list of members, see http://businessroundtable.org/about/members. We thank Drew Lyon for providing data that we used in calibrating the model for our analysis.
EXECUTIVE SUMMARY

In response to widespread concerns that the income tax system in the United States is highly inefficient, unfair, unnecessarily complicated, and discourages economic growth while putting US multinational companies at a disadvantage relative to their foreign competitors, numerous proposals for sweeping reforms have been advanced in recent years. In June 2016, House Speaker Paul Ryan (R-WI) and Rep. Kevin Brady (R-TX), Chair of the House Ways and Means Committee, put forth a blueprint for tax reform commonly referred to as the House Republican Tax Plan (HRTP), a proposal that would dramatically change the taxation of business income in the United States and implement significant changes of the individual income tax as well. In particular, the HRTP would reduce business tax rates dramatically, tax businesses on a cash-flow basis (allowing expensing rather than deductions for depreciation and eliminating deductions for the interest on debt-financed investment), and introduce a destination-based territorial business tax that would include new “border adjustments” – the element of the proposal that has generated the most controversy. The border adjustments would deny business deductions for imported production inputs, apply tax to imported consumer goods, and exclude from the cash flow tax base all receipts from export sales. Individual income tax rates on both labor and capital income would also be lowered, coupled with increases in standard deductions, the elimination of personal exemptions, and the elimination of various deductions, exemptions, and other tax preferences.

Such proposals have a broad range of complex and interacting effects on the performance of the US economy. One commonly used way to investigate the net results of many of these interactions, including their dynamic effects on economic growth and other macroeconomic variables, is to simulate them within the context of a dynamic computable general equilibrium model. In this report, we present the results of such a simulation, using the Diamond and Zodrow Model.

As has been widely reported, the HRTP is not a revenue neutral reform. We assume that the deficits that arise under HRTP – taking into account the dynamic effects of the reform on revenues – are offset with additional government borrowing for the first ten years after
enactment of the reform. This increases the debt-GDP ratio in the economy, which remains constant at a higher level beginning in the eleventh year after reform. The government is then assumed to balance its annual budget with changes in total transfer payments, which initially decline and then increase. The simulation results suggest that the net macroeconomic effects of enacting the HRTP would be positive, with an increase in GDP of 1.8 percent ten years after the enactment of reform and 3.3 percent in the long run. These increases are attributable to many factors, including an increase in domestic investment, a reallocation of firm-specific capital that earns above normal economic rents to the United States, and a sizable reversal of income shifting, as well as modest increases in labor supply and larger increases in labor compensation. These results suggest that enactment of the HRTP would have positive net effects on the macroeconomic performance of the US economy.
DYNAMIC ESTIMATES OF THE MACROECONOMIC EFFECTS OF THE
HOUSE REPUBLICAN TAX REFORM PLAN

John W. Diamond and George R. Zodrow

I. OVERVIEW

The income tax system in the United States is ripe for reform. The last fundamental reform of the system was the much-celebrated Tax Reform Act of 1986 (TRA86), which followed the classic model of a base-broadening, rate-reducing (BBRR) reform that financed significant corporate and personal rate cuts with the elimination of a wide variety of tax preferences. In the interim, however, many countries around the world have reformed their tax structures. This is especially true for corporate income taxes abroad, where many nations – at least partly in response to the inexorable forces of globalization and international tax competition (Zodrow, 2010) – have dramatically reduced statutory rates while enacting base broadening measures that have kept corporate tax revenues roughly constant as a share of GDP (Bilicka and Devereux, 2012). As a result, the United States, which was a relatively low tax country after TRA86, now has the highest statutory corporate tax rate in the industrialized world, and has also lost its former advantage in marginal effective corporate tax rates (which take into account features of a tax system beyond the statutory rate, including accelerated deductions for depreciation as well as any “bonus depreciation,” investment tax credits and other investment allowances, the method of finance and, in some cases, industry-specific tax preferences).

Proponents of corporate income tax reform argue that such high tax rates (1) discourage investment and capital accumulation and thus reduce productivity and economic growth, (2) discourage foreign direct investment in the United States while encouraging US multinational companies (MNCs) to invest abroad, and (3) encourage US – and foreign multinational investing in the United States – to engage in income shifting, using a variety of techniques to move revenues to low tax countries and move deductions to the relatively high tax United States. In addition, the combination of a high statutory tax rate coupled with a wide variety of tax preferences distorts the allocation of investment across asset types and industries and reduces the productivity of the nation’s assets, while exacerbating the many inefficiencies of the corporate income tax, including distortions of business decisions regarding the method of finance (debt vs. equity in the form of retained earnings or new share issues), organizational form (corporate vs. non-corporate), and the mix of retentions, dividends paid, and share repurchases (Gravelle, 1994; Nicodème, 2008).
A separate issue that has attracted a great deal of attention is the tax treatment of US and foreign MNCs under current law. Following recent reforms in the United Kingdom and Japan, the United States is now the only major industrialized country that operates a worldwide tax system under which the foreign-source income earned by US subsidiaries is subject to a residual US tax when repatriated to the US parent, subject to a credit for foreign taxes paid. By comparison, most other countries (e.g., 29 of the other 34 OECD nations) operate a territorial system under which the active foreign-source income of their domestically headquartered MNCs is largely exempt from any residual domestic taxation. Proponents of eliminating the residence-based worldwide tax system in the United States argue that it would improve the international competitiveness of US multinationals and end the current tax bias against the repatriation of foreign-source income that arises as firms defer repatriation to avoid paying residual US taxes.

There is also widespread discontent with the individual income tax system. The top marginal income tax rate has increased to 39.6 percent from the 28 percent enacted under TRA86, while the number and value of individual tax preferences have grown substantially. Indeed, individual tax expenditures – the estimated revenue costs of differences in the individual tax system relative to a benchmark comprehensive personal income tax – as calculated by the Joint Committee on Taxation (2017) are the same order of magnitude as total personal income tax revenues. The arguments for reform are the same as those made during the debates surrounding TRA86 (US Department of the Treasury, 1984; McLure and Zodrow, 1987; Diamond and Zodrow, 2011): high individual tax rates coupled with widespread tax preferences inefficiently distort decisions regarding labor supply, saving, consumption patterns, and methods of compensation, significantly complicate administration of and compliance with the tax system, encourage tax avoidance and evasion, and result in a tax system that is widely perceived to be fundamentally unfair.

These developments have by no means gone unnoticed in the United States and numerous proposals for tax reform have emerged in recent years. These include the reports of the President’s Advisory Panel on Federal Tax Reform (2005), the National Commission on Fiscal Responsibility and Reform (2010), the Debt Reduction Task Force of the Bipartisan Policy Center (2010), and the legislative discussion draft issued on February 26, 2014 by Representative Dave Camp (R-MI), Chairman of the House Ways and Means Committee.¹

¹ The legislative text of the Camp discussion draft is available at http://waysandmeans.house.gov/UploadedFiles/Statutory_Text_Tax_Reform_Act_of_2014_Discussion_Draft_022614.pdf. For analyses of the draft legislation see Joint Committee on Taxation (2014a, b) and Diamond and Zodrow (2014).
Most recently, in June 2016, House Speaker Paul Ryan (R-WI) and Chair of the House Ways and Means Committee, Rep. Kevin Brady (R-TX) put forth a blueprint for tax reform commonly referred to as the House Republican Tax Plan (HRTP). This plan proposes dramatic changes in both business and individual level taxation in the United States that are designed to address many of the problems outlined above. In particular, the HRTP would reduce business tax rates dramatically, tax businesses on a cash-flow basis (allowing expensing rather than deductions for depreciation and eliminating deductions for the interest on debt-financed investment), and introduce a destination-based territorial business tax that would include new “border adjustments” – the element of the proposal that has generated the most controversy. The border adjustments would deny business deductions for imported production inputs, apply tax to imported consumer goods, and exclude from the cash flow tax base all receipts from export sales. Individual income tax rates would also be lowered, coupled with the elimination of various deductions, exemptions, and other tax preferences. In this study, we report the results of a numerical simulation of the macroeconomic effects of the HRTP using the Diamond and Zodrow (DZ) model, a dynamic, overlapping generations, computable general equilibrium model designed to analyze both the short-run and long-run macroeconomic effects of tax reforms in the United States. We focus solely on aggregate macroeconomic effects, and thus do not consider the distributional implications of the reform, which have also been quite controversial.

The report proceeds as follows. In the following section, we outline the main provisions of the HRTP. Section III provides a brief description of our computable general equilibrium model, while the results of the simulation of the HRTP are reported in Section IV. The final section offers some conclusions and caveats.

II. THE HOUSE REPUBLICAN TAX REFORM PLAN

In this report, we simulate the effects of the comprehensive reform of the business and individual income tax systems in the United States proposed in the HRTP. The conventional or “static” estimates of the revenue effects of the specific provisions of the proposal and the changes in marginal tax rates that are incorporated in the calibration of our model are included in the appendix. These estimates, which include transition rules that provide for continued deduction of depreciation allowances on existing investment, a ten-year phase-out of the deduction of interest expense on existing debt, and retain the net investment tax and Medicare tax enacted under the Affordable Care Act (ACA), indicate that the HRTP would lose $2.1 trillion over the ten-year period 2018-2027. This figure is roughly comparable to the estimate of static revenue losses of the Tax Policy Center (TPC) (2016), which is $3.1 trillion over the eleven years 2016-2026, including $803 billion for repeal of the ACA taxes as well as continued full deductions for depreciation on existing investment and interest on existing debt. Another estimate is provided by the Tax Foundation (2016), which makes the same assumptions regarding transition rules as the TPC and calculates a static revenue loss of $2.4 trillion over the ten-year period 2016-2025. These estimates assume a “current law” baseline, that is, they assume that a wide variety of temporary tax reductions will expire as currently scheduled; by comparison, a “current policy” baseline would assume that that these provisions, many of which have been renewed multiple times in the past, will be extended indefinitely.3 The main features of the HRTP are as follows.

A. General Features

According to Speaker Ryan and Chair Brady, the HRTP “envisions tax reform that is revenue neutral,” where revenue neutrality is defined to take into account the dynamic macroeconomic effects of the reform of the type analyzed in this report. The HRTP assumed as part of health care reform repeal of all of the taxes enacted under the 2010 Affordable Care Act (ACA), including the 3.8 percent Net Investment Income Tax, the 0.9 percent Medicare surtax on wages of high-income earners, and the excise tax on medical devices,4 coupled with

3 For example, bonus depreciation has been in effect in all but three years since 2001, and in 2015 was extended through 2019, at a rate of 50 percent through 2017, 40 percent in 2018, and 30 percent in 2019. The “current policy” baseline assumes that bonus depreciation continues forever, while the “current law” baseline that we utilize assumes that bonus depreciation ends as currently scheduled. The current law assumption implies that the revenue required for revenue neutrality is approximately $460 billion more over the ten years following enactment than it would be under the current policy baseline.

4 The HRTP also assumed that health care reform included elimination of the “Cadillac tax” on high-premium health insurance plans, which would be replaced with an offsetting limit on the tax exclusion for employer-provided health insurance.
expenditure reductions that would have been enacted as part of the plan to “repeal and replace” the ACA. We do not model any changes to ACA taxes as part of the HRTP, viewing any such changes as part of separate health care reform legislation. Finally, although the HRTP notes the need for “a smooth transition from the current system to the new system,” it does not specify any transition rules. We describe the transition rules that we use in our model simulations below.

B. Business Tax Reforms

Four features of the tax treatment of businesses under the HRTP are especially noteworthy: (1) the proposed change from income taxation to cash flow taxation, including expensing (immediate write-off) of most business investment coupled with the elimination of the deductibility of net interest expense, (2) the proposed reduction in the corporate tax rate from 35 percent to 20 percent, coupled with a reduction to 25 percent of the maximum tax rate applied to businesses not subject to the corporate income tax (hereafter referred to as “noncorporate” businesses, defined broadly to include all “pass-through” business entities that are not subject to the corporate income tax and are instead taxed at the individual income tax level, including Subchapter-S corporations, LLCs, LLPs, partnerships, sole proprietorships, etc.); (3) the proposed change from origin-based to destination-based taxation including the border adjustments noted above, and (4) the proposed change from a residence-based taxed system, under which the active foreign-source earnings of US multinationals are subject to tax upon repatriation after a foreign tax credit, to a territorial system under which such earnings are exempt from tax. We begin with a discussion of these four features and then describe the other major proposed changes to the taxation of businesses.

1. Business Cash Flow Taxation

The HRTP would introduce a cash flow business tax that would be applied uniformly to both corporate and noncorporate businesses. In particular, all purchases of depreciable capital assets would be expensed rather than depreciated, and purchases of inventories would similarly be immediately deducted rather than subject to the inventory tax accounting of current law. Simultaneously, net interest expense would no longer be deductible (but could be carried forward indefinitely and deducted against future interest income), which would imply the elimination of interest deductibility for non-financial debt-financed investments. Negative cash flows could not be carried back, but would be carried forward indefinitely with interest so that their value would remain constant in present value terms.

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5 Purchases of land would continue to be non-deductible.
Considered in isolation, switching to a cash flow tax that allows expensing coupled with the elimination of interest deductibility would in principle result in a business-level marginal effective tax rate of zero on capital investment in all assets other than land, irrespective of whether the investment is debt or equity financed. This would reduce the cost of capital for, and thus stimulate investment in, equity-financed investment, while increasing the cost of capital for debt-financed investment, in which case the benefits of expensing would be more than offset by the elimination of interest deductibility. Such a reform has long been advocated by many academic and business economists as well as policy makers, as it would (1) convert the business tax to a relatively non-distortionary tax on economic rents, including immobile location-specific rents, (2) eliminate the business tax bias favoring debt finance that characterizes the current income tax system, and (3) simplify the tax system by moving to cash flow rather than accrual tax accounting (in particular, there would be no need for tax depreciation accounting or inflation adjustment of the corporate income tax base). However, many observers have noted that moving to expensing has a significant revenue cost and thus implies that statutory business tax rates would be higher than under the alternative of a business income tax system that allowed inflation-indexed deductions for economic depreciation. Such relatively high statutory tax rates encourage the shifting of income and production that generates firm-specific rents to lower-tax jurisdiction while subjecting to tax all remaining economic rents – all phenomena that we capture in our model. Some researchers have also suggested that expensing may be less effective than predicted by standard economic models of profit maximization if business managers focus on income reported in financial statements (which follow accounting rules that ignore the benefit of accelerating deductions for depreciation, including expensing, relative to taking deductions for economic depreciation) rather than on actual after-tax income in making investment decisions, or on “headline” statutory tax rates rather than effective tax rates (Batchelder, 2017; Neubig, 2006). We do not model such behavioral factors related to the impacts of financial statements on business decision making in our simulations.

2. Business Rate Reduction

The HRTP would reduce the maximum corporate tax rate from 35 percent to 20 percent. The income from pass-through entities such as S corporations, LLCs, LLPs, partnerships, and

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6 For example, the Tax Policy Center (2016) estimates that the HRTP would reduce the combined business and individual marginal effective tax rate on corporate equity-financed investment from 30.8 percent to 8.3 percent, but increase the marginal effective tax rate on corporate debt-financed investment from −7.4 percent (the negative tax rate reflects the benefit of interest deductibility combined with accelerated deductions for depreciation and other tax preferences) to 9.8 percent, resulting in a reduction in the overall effective corporate tax rate from 22.0 percent to 6.3 percent. By comparison, the HRTP reduces the marginal effective tax rate on investment by pass-through businesses from 18.9 percent to 2.5 percent.
sole proprietorships, which is taxed at the individual level, would be subject to a maximum tax rate of 25 percent, relative to a maximum tax rate of 39.6 percent under current law (the top individual income tax rate). The domestic manufacturing deduction (Section 199) and various other business tax credits (other than the research and experimentation credit) as well as the business alternative minimum tax would be eliminated. These provisions would create an incentive for individuals to re-characterize labor income, which would be taxed at the new maximum rate of 33 percent, as business income, which would be subject to the new 25 percent maximum rate. Although such provisions are difficult to design and enforce, the HRTP states that pass-through businesses and sole proprietorships would be required to pay (or would be treated as having paid) “reasonable compensation to their owner-operators” in order to limit this form of tax evasion. At the same time, tax evasion in the noncorporate sector might decline in response to the reduction in the tax rate applied to noncorporate income, as suggested by the work of Joulfaian and Rider (1998). In our simulations, we adjust the amount of corporate income shifting that is reversed under the HRTP to reflect these possibilities.

One disadvantage of rate reduction is that, in the absence of any special transition rules, the rate reduction applies not only to the income earned by new investment but also to the income earned from existing capital, thus losing revenue relative to current law while conferring a windfall gain to the owners of existing capital without improving the incentives for new investment. This phenomenon is captured in our model, which assumes that the owners of existing capital are allowed to continue to deduct the remaining tax basis of their assets (which is relatively low due to accelerated deductions for depreciation as well as bonus depreciation) according to pre-reform depreciation schedules.

3. Implementing a Destination-Based Cash Flow Tax

The HRTP would also convert the business tax to a tax based on domestic consumption – a destination-based cash flow tax (DBCFT) – rather than the domestic production that forms the base of the current income tax. This would be achieved by making “border adjustments,” which would involve denying business deductions for imported production inputs, applying tax to all direct purchases by consumers of imported goods, and excluding from the cash flow tax base all

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7 In certain cases, this rate is increased by the 3.8 percent Net Investment Income tax, which, as noted above, is retained under our modeling of the HRTP.

8 Note that a 25 tax rate on the price of imports is consistent with denying deductions for imported inputs with a 20 percent corporate rate. To see this, denote the price of the imported input in the foreign currency as \( p \), the corporate tax rate as \( t \), and the exchange rate in units of the foreign currency per US dollar as \( e \), with \( e = 1 \) before the enactment of reform. Eliminating deductibility increases the price of the imported input from \( p(1-t) \) to \( p \). However, if after the enactment of reform the dollar appreciates so that the

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receipts from export sales. Although such border adjustments are allowed under current World Trade Organization (WTO) rules for indirect taxes such as the Value-Added Tax (VAT), they are not currently allowed for direct taxes such as an income tax. In addition, WTO rules require domestic production and imported goods to be treated identically. Some have questioned whether the HRTP satisfies this requirement since it would impose a border adjustment on the entire value of imports while allowing a deduction for labor costs for domestically-produced goods.\(^9\) For modeling purposes, we assume that the HRTP is deemed to be compliant with WTO rules, either by agreement or revisions to WTO rules.

Since much attention has recently been focused on the economic impact of these border tax adjustments, they merit further discussion. Although some observers have argued that they amount to taxes on imports into the United States and subsidies for US exports and thus would improve the US trade balance by reducing imports and stimulating exports, most economists argue that these effects would be largely if not fully offset by appreciation of the US dollar and would thus have no or relatively small effects on trade.

This basic argument is most easily seen in the context of uniform border adjustments that apply to all goods and services.\(^10\) The imposition of border adjustments would initially increase the price in the US of goods produced with imported inputs and imported goods and reduce the foreign price of US exports. The increase in the price of US imports would reduce demand for imported goods and thus reduce demand for the foreign currency, resulting in appreciation of the US dollar. The reduction in the foreign price of US exports would increase foreign demand for them and thus also result in a strengthening dollar. As long as the import tax and the export subsidy are at the same rate, as they would be under the border adjustments described above, the dollar appreciation would (1) exactly offset the effects of the import tax, as the price of imports into the United States would decline by the amount of the import tax, and (2) exactly offset the exchange rate becomes \(e^*=1/(1-t)=1/(1-0.2)=1.25\), the price of the imported input in US dollars becomes \(p/e^*=p(1-t)\), which is identical to the price before the enactment of reform with border adjustments.

\(^9\) Note that the DBCFT would be WTO-compliant if it were converted to an economically equivalent destination-based value-added tax coupled with a wage subsidy (e.g., a payroll tax rebate). Auerbach and Holtz-Eakin (2016) argue that this equivalence suggests that the DBCFT should in principle be deemed WTO-compliant, although it is not clear that this would in fact be the case.

\(^10\) For an especially clear exposition of this argument, see Auerbach (2017a). See also, among others, Grossman (1980), Feldstein and Krugman (1990), Gillis, Mieszkowski, and Zodrow (1996), Bradford (2003), Viard (2009), and Auerbach and Holtz-Eakin (2016). Lockwood, de Meza, and Myles (1994) extend the results of simple models to a wide variety of more complex scenarios, and Auerbach and Holtz-Eakin (2016) provide numerical examples of the neutrality of border adjustments, including those associated with a destination-based cash flow tax.
effects of the export subsidy, as the price of the US exports in the foreign currency would increase by just enough to offset the import subsidy. As a result, the net-of-tax prices in US dollars of imports into the United States and the net-of-tax prices of exports in the foreign currency would be unchanged. The border adjustments would thus have no effect on either exports or imports – the appreciation of the dollar implies that all trades that were beneficial to both parties before the change to a destination-based tax and the border adjustments would still be beneficial – and hence no effect on the trade balance. As stressed by Auerbach and Holtz-Eakin (2016), “border adjustments are not trade policy … they are paired and equal adjustments that create a level tax playing field for domestic and overseas competition … Border adjustments do not distort trade, as exchange rates should react immediately to offset the initial impact of these adjustments.”

We accept this argument in our analysis, and our simulations assume full exchange rate adjustment. However, we recognize that the assumption that exchange rates would adjust fully and immediately as described above is controversial; in particular, companies that rely heavily on imported inputs are strongly opposed to enacting a reform on the assumption that exchange rates would adjust immediately to offset what appears to be a significant tax on imports (coupled with an apparent export subsidy of the same magnitude). In addition, some economists have stressed that exchange rate adjustments are uncertain. For example, Rogoff (2017) observes that empirical evidence indicates that “exchange rates can move wildly away from their fundamentals for many years at a time.” In addition, although generally sympathetic to the assumption of full adjustment, Gale (2017) notes that international capital flows affecting exchange rates are much larger than trade flows, and such capital flows may be affected by both the enactment of tax reform as well as many other factors; as a result, the expected exchange rate adjustment may be offset by other factors and will be difficult to identify empirically in any case.11 12 Moreover,

11 In addition, the business tax rate relevant for the exchange rate adjustment is ambiguous under the HRTP since the corporate rate would be reduced to 20 percent but the tax rate on pass-through entities would be 25 percent. This issue does not arise in our model, since all trade occurs in the multinational corporate sector.

12 Freund and Gagnon (2017) examine the effects of border-adjusted taxes and find that “the real exchange rate tends to rise by the full amount of any consumption tax increase, with little effect on the current account balance and modest offsetting effects on the trade and income balances,” evidence that is consistent with the “full adjustment” scenario. They caution, however, that most of the cases analyzed were of VATs rather than the business cash flow tax proposed under the HRTP, and that adjustment might be slower in the case of the HRTP due to the special role of the US dollar in international finance and because the required adjustment would be larger than those observed in the cases they analyze. Kotlikoff (2017) suggests that the passage of the HRTP be accompanied by a Congressional resolution “calling on the Federal Reserve to ensure a 20 percent appreciation of the dollar upon enactment of the House tax plan.”
most US imports and exports are priced in dollars rather than foreign currencies, so that the effects of the exchange rate adjustment described above would occur only as contracts are renegotiated. To the extent that these factors imply that the exchange rate adjustment would be delayed, our model does not capture the transitional problems associated with adopting border adjustments. In any case, because the production sectors in our model are highly aggregated – for example, the model includes a single aggregate multinational sector and does not distinguish between businesses that are primarily importers and those that are primarily exporters – we could not in any case analyze the issue that has generated so much controversy with respect to border adjustments, that is, the effects of a delayed exchange rate adjustment on specific industries such as businesses that rely heavily on imported inputs.

A separate issue is that, even with full exchange rate adjustment in our benchmark scenario, the combination of a switch to a destination-based tax and border adjustments would have two additional effects. First, because the United States is a net importer, the border adjustments would raise revenue; that is, more revenue would be raised from taxing imports than from eliminating tax from exports. We include this revenue gain in our simulations. Second, because residents of the United States hold more assets than liabilities that are denominated in foreign currencies, the dollar appreciation described above would result in a significant one-time reduction in their wealth to the extent that wealth is eventually spent in the US. Auerbach (2017b) estimates that this reduction in wealth would equal roughly 11.3 percent of GDP (approximately $2.1 trillion). We include this one time wealth effect in our simulations as well. We do not, however, attempt to model any international macroeconomic impacts of a 25 percent appreciation of the dollar, which Graetz (2017) notes “are uncertain … perhaps creating both stagnation in the global economy and inflation.”

The combination of a destination-based tax and a tax based on business cash flow would be unique in the world and implies that the HRTP would change the business tax system in the

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13 The static estimate of this revenue increase incorporated in the model is $1.3 trillion over the first ten years after enactment of the reform (2018-2027) under the assumption – which we adopt – that border tax adjustments on exports are not refundable but are carried forward with interest. This figure is roughly comparable to the Tax Policy Center estimate of $1.2 trillion (over 2016-2026) and the Tax Foundation static estimate of $1.1 trillion over 2016-2025, adjusting for the different budget periods assumed. Note, however, that if the border adjustment on exports were refundable (or if companies restructured to ensure that they could take advantage of all rebates on exports), the ten-year revenue gain from border adjustments would decline significantly.

14 The Auerbach estimate is similar to that of Farhi et al. (2017), except that Auerbach reduces the loss to account for the fraction of shareholders of US corporations that are foreign. Neither estimate accounts for the effects of hedging of foreign currency risk, which would further reduce the estimated wealth loss.
United States to a tax on the economic rents associated with new investments and the capital income attributable to old investments that is used to finance domestic consumption in the United States. Thus, economic rents earned on foreign sales by US MNCs would not be subject to tax, and economic rents that were spent abroad, including those earned by foreign owners of capital utilized in the United States, would also be untaxed.

These revenue losses would, however, be accompanied by significant gains. Note that border adjustment implies that transactions with foreign entities have no effect on the tax base (export sales are ignored and deductions are denied for foreign inputs). Thus, US MNCs would not be able to reduce their tax liability with current commonly used techniques that shift income to subsidiaries in lower-tax jurisdictions abroad, including tax havens, such as transfer pricing, loans, or transferring the ownership of intellectual property rights or other ownership rights. Similarly, because tax liability would be based on consumption rather than production, moving production to a company in a lower-tax jurisdiction abroad (including inversion schemes that transfer ownership to a new foreign parent) would not reduce tax liability to the extent that the business continued to sell goods that were consumed in the US market. Indeed, as noted by Graetz (2017), border adjustments would solve “many of the most vexing problems of international taxation of corporate income, problems that have occupied the OECD in its BEPS [Base Erosion and Profit Shifting] project for several years without any satisfactory conclusion.” Another implication is that the costs of tax administration, enforcement, and compliance associated with multinational enterprises could decline significantly.

4. Implementing a Territorial Tax

The HRTP would also eliminate the current system of residual taxation of foreign-source income, under which the foreign earnings of US multinationals are subject to the US corporate income tax when they are repatriated to domestic parent firms, with domestic credits for foreign taxes paid. The current system thus allows deferral of tax as well as “cross-crediting” under which foreign tax credits earned in high-tax foreign countries can be used to offset tax on income earned in low-tax countries (which would be taxed domestically if the credits were applied on a country-by-country basis). As a result, residual taxation of US multinationals raises relatively little revenue but distorts economic behavior, including creating a tax bias against repatriation. Under HRTP, this “residence-based” tax regime would be replaced by a “territorial” tax system under which the active foreign-source earnings of US multinationals would be exempt from tax. This reform would result in a system of international taxation similar to those utilized by most of our trading partners, including most recently the UK and Japan.

The move to a territorial system would lose revenue, although the revenue loss would be relatively small, as the current system, which is characterized by the deferral, foreign tax credits and cross-crediting described above, raises relatively little revenue ($33.6 billion in 2013). This revenue would be even lower at a 20 percent corporate tax rate. Our modeling incorporates an
estimate that the net revenue effects of the move to a territorial tax system would be a revenue loss of $172 billion over 2018-2027.

5. Transition Tax on Unrepatriated Earnings and Other Transition Provisions

Taxation on a destination basis implies that US MNCs would no longer be taxed on funds repatriated to US parents by their foreign subsidiaries. The resulting windfall gain for assets held abroad would be offset by a one-time transition tax on accumulated unrepatriated earnings, assessed at a 3.5 percent rate on all such earnings other than those held in cash and cash equivalents, while cash and cash equivalents would be taxed at an 8.75 percent rate. Payment of the resulting tax liability would be phased-in over an eight-year period. The transition tax would presumably result in some repatriation of the existing stock of unrepatriated profits which, if largely distributed to shareholders as taxable dividends or share repurchases as suggested by Dharmapala, Foley, and Forbes (2011) in their analysis of the repatriation tax holiday in the American Jobs Creation Act (AJCA) of 2004,\(^\text{15}\) would generate some additional revenue, which is included in the revenue estimate noted above.

We assume that the owners of existing capital are allowed to continue to take the deductions specified under current law for the remaining lives of their assets. In addition, following the recent tax reform proposal made by Congressman Devin Nunes (R-CA),\(^\text{16}\) we assume that interest deductions are eliminated immediately, but taxpayers are allowed a deduction for the interest on the amount of their outstanding loans the year before enactment of the reform, which is phased-out over ten years.

\(^{15}\) Dharmapala, Foley, and Forbes (2011) estimate that a $1 increase in repatriations due to the tax holiday was associated with an increase of almost $1 in payouts to shareholders (a total payout of $0.92, consisting of $0.79 of increased share repurchases – a convenient and low-tax means of distributing funds from a one-time tax holiday – and $0.13 in additional dividends), and had no measurable impact on domestic investment, employment, R&D expenditures, or debt levels, even for a subset of firms that appeared to be financially constrained. They interpret this result as indicating the US multinationals are well managed and had already taken advantage of profitable investments prior to the tax holiday and thus simply returned the excess funds to shareholders rather than expending the funds on unprofitable capital investments or employment. Although these results have been controversial (for example, Faulkender and Petersen (2012) estimate that a sample of financially-constrained firms increased investment by 11 percent and Brennan (2013) concludes that most repatriated funds were used for acquisitions and debt reduction rather than share repurchases), we follow Dharmapala, Foley, and Forbes in assuming that the move to a territorial system would not generate a significant increase in domestic investment. Note also that it is less likely that firms are cash constrained in the current low interest, non-recessionary environment than they may have been in the recent past.

6. Other Features

The HRTP would eliminate the corporate alternative minimum tax.

The plan would eliminate all special business tax credits other than the current Research and Experimentation tax credit and would repeal the domestic production deduction (Section 199).

The HRTP also states that numerous other “special-interest provisions” for businesses would be eliminated. However, since it makes no specific proposals other than those described above, we do not model the elimination of any other business tax preferences.

The HRTP would also streamline and simplify the IRS Subpart-F rules, which under present law apply tax currently to certain funds that are held abroad (typically in tax havens) but deemed repatriated, so that they apply only to passive income.

C. Individual Income Tax Reforms

1. Individual Tax Rates

HRTP would replace the seven tax brackets under the current individual income tax (10, 15, 25, 28, 33, 35, and 39.6 percent) with three income brackets, which would be subject to tax at rates of 12, 25, and 33 percent. Capital gains, dividends, and interest income would receive a 50 percent deduction, resulting in a maximum rate of 20.3 percent – relative to current law top rates of 23.8 percent on capital gains and dividends and 43.4 percent on interest income (in both cases including the 3.8 percent tax on net investment income).

2. Standard Deductions, Personal Exemptions, and Child/Dependent Credits

The plan would also significantly change the current system of standard deductions and personal exemptions, which in 2016 provided standard deductions of $12,600 for married couples filing jointly, $6,300 for single taxpayers (and married couples filing jointly), and $9,300 for single heads of households,17 coupled with personal exemptions of 4,050. Under HRTP, these standard deductions and all personal exemptions would be replaced by a single standard deduction of $24,000 for married couples filing jointly, $12,000 for single taxpayers, and $18,000 for single heads of households. HRTP would also increase the child tax credit to $1,500

17 In addition, qualifying widows or widowers received a standard deduction of $12,600, and elderly or blind taxpayers received a supplemental standard deduction of $1,250 (or $1,550 if the individuals is unmarried and not a qualifying widow or widower).
from $1,000 (only $1,000 would be refundable) and add a non-refundable $500 credit for other dependents. These credits would be phased out at higher income levels.

3. Itemized Deductions

HRTP would eliminate all itemized deductions except for the deductions for home mortgage interest and charitable contributions, which would remain unchanged relative to current law. The plan notes that these provisions would be reviewed to make them simpler, more effective, and more efficient, but provides no details. Our analysis assumes continued deductibility of home mortgage interest and charitable contributions under the provisions of current law. Note that these reforms would reduce compliance and administration costs, as they would dramatically reduce the number of taxpayers who itemize their deductions – by 84 percent (from 45 million to 7 million) according to a recent estimate by the Tax Policy Center (2016).

4. Wealth Transfer Taxes

The HRTP would eliminate all current wealth transfer taxes – the federal estate and gift tax as well as the generation-skipping tax. This reform would further reduce the taxation of capital income and eliminate consumption/bequest distortions for some high-wealth individuals – as well as the incentive for them to make charitable contributions. It would, however, also eliminate one of the most progressive elements of the federal tax system, as the estate tax in 2016 applied only to taxable estates in excess of $5.45 million for single individuals and $10.9 million for married couples.

D. Other Provisions

The HRTP would continue the Earned Income Tax Credit (EITC), although it may include some unspecified reforms to improve work incentives under the EITC. It also recommends, without providing details, consolidation and simplification of incentives for higher education, and continues the favorable treatment of retirement savings under current law. Although HRTP suggests that such savings incentives might be expanded to allow “Universal Savings Accounts” which would provide for cash flow treatment of savings with no penalties for pre-retirement withdrawals, it makes no specific proposals so we do not model it as part of the plan.

18 The HRTP argues that continuing deductibility of home mortgage interest will encourage homeownership. However, this argument is suspect as the benefits of deductibility decline with the proposed reduction in marginal tax rates, are non-existent for taxpayers who do not itemize deductions (the number of which would increase significantly under HRTP), and are small for households whose mortgage interest is comparable to the standard deduction.
The HRTP also states that numerous “special-interest provisions” for individuals would be eliminated. However, since it makes no specific proposals other than those described above, we do not model any such additional measures as part of the plan.
III. OVERVIEW OF THE DIAMOND-ZODROW MODEL

This section provides a short description of the model used in this analysis; for more details, see Zodrow and Diamond (2013) and Diamond and Zodrow (2015). The discussion first considers the domestic component of the model and then turns to a discussion of its international aspects, including its modeling of US and foreign MNCs. The model combines various features from other broadly similar CGE models, including those constructed by Auerbach and Kotlikoff (1987), Goulder and Summers (1989), Goulder (1989), Keuschnigg (1990), Fullerton and Rogers (1993), Bettendorf, Devereux, van der Horst, Loretz, and de Mooij (2009), and de Mooij and Devereux (2011). Key parameter values used in the simulation are listed in the appendix; for discussion of some of these choices, see Gunning, Diamond, and Zodrow (2008). Versions of the model have been used in analyses of tax reforms by the US Department of the Treasury (President’s Advisory Panel on Federal Tax Reform, 2005), the Joint Committee on Taxation (2005), and in a number of other recent tax policy studies (Diamond and Zodrow, 2007, 2008, 2013, 2014, 2015; Diamond, Zodrow, Neubig, and Carroll, 2014; Diamond and Viard, 2008).

A. Modeling the Domestic Economy

The domestic component of the Diamond-Zodrow model includes both corporate and non-corporate composite consumption goods and owner-occupied and rental housing, with the corporate sector subject to the corporate income tax and subdivided into domestic and multinational firms as described below, and the “non-corporate” sector – which includes S corporations as well as LLCs, LLPs, partnerships and sole-proprietorships – taxed on a pass-through basis at the individual level. Firms combine labor and several different types of capital to produce their outputs at minimum after-tax costs. The time paths of investment are determined by profit-maximizing firm managers who take into account all business taxes (including all tax preferences) as well as the costs of adjusting their capital stocks, correctly anticipating the macroeconomic changes that will occur after a tax reform is enacted. Firms finance their investments with a mix of equity and debt, and choose an optimal debt-asset ratio that balances the costs and benefits of additional debt, including its tax advantages.

On the consumption side, household supplies of labor and saving for capital investment and demands for all housing and nonhousing goods are modeled using an overlapping generations structure in which a representative individual in each generation spends a fixed amount of time working and in retirement, makes consumption choices to maximize lifetime welfare subject to a lifetime budget constraint that includes personal income and other taxes, and makes a fixed “target” bequest.

The government purchases fixed amounts of the composite goods and makes transfer payments, which it finances with the corporate income tax, a progressive tax on labor income after deductions and exemptions, and constant individual-level average marginal tax rates applied to capital income in the form of interest receipts, dividends, and capital gains. The
modeling of corporate income tax revenues includes explicit consideration of deductions for depreciation or immediate expensing for both new and old assets (which are treated separately), other production and investment incentives, and state and local income and property taxes. We assume that for the first ten years after the enactment of the HRTP the government finances the deficits that arise (after taking into account the dynamic effects of the reform on revenues) with additional debt. This increases the debt-GDP ratio in the economy (which remains constant at a higher level beginning in the eleventh year after reform). The government then offsets any remaining deficits or surpluses due to the enactment of the HRTP with changes in total transfer payments; in the simulation results reported below, transfers are reduced for 15 years (that is during years 11-25 after the enactment of reform) and then increased in all years after year 25.

State and local governments finance fixed levels of purchases of the composite goods with sales, property, and income taxes. Tax policy in the rest of the world is assumed to remain constant; in particular, other countries do not respond to a corporate income tax rate reduction in the United States by further reducing their own tax rates.

All markets are assumed to be in equilibrium in all periods, and the economy must always begin and end in a steady-state equilibrium, with all of the key macroeconomic variables growing at the exogenous growth rate, which equals the sum of the population and productivity growth rates; tax reform thus cannot affect the long term growth rate in the economy. The model does not include unemployment, so that any labor supply response that is observed reflects changes in labor supply in the context of a full employment economy.

**B. Modeling the International Economy**

The Diamond-Zodrow model includes a simplified foreign or “rest-of-the-world” (RW) sector, with international trade and capital movements between the US and RW. The model includes (1) US and foreign multinationals (parents and subsidiaries), which play the key role in determining the allocation of highly mobile firm-specific capital (e.g., intangibles, including intellectual property, combined with unique managerial skills) that earns above-normal returns as well as the allocation of less mobile ordinary capital that earns normal returns, as well as the use of intermediate goods that are traded between the affiliates of the MNCs,\(^\text{19}\) (2) income shifting between high and low tax countries,\(^\text{20}\) (3) a decision by the US subsidiary regarding how much

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\(^{19}\) The assumption of differential international mobility of capital follows Becker and Fuest (2011). The inclusion of intermediate goods in the production functions of MNC parent firms and subsidiaries follows Desai, Foley, and Hines (2009).

\(^{20}\) For recent discussions of the issues raised by income shifting, see Organisation for Economic Co-operation and Development (2013), Dharmapala (2014), and Clausing (2016).
of its profits to repatriate to the parent firm in the presence of costs of adding to the stock of unrepatriated profits,\textsuperscript{21} and (4) a balance of payments condition that links the domestic and international economies. To simplify the analysis, the RW is modeled as consisting entirely of the MNC sector (both US-MNC subsidiaries and RW-MNC parents); we thus effectively assume that the remainder of RW is unaffected by the tax reforms analyzed.

A key feature of the model – and one of the important determinants of the simulation results – is the extent and nature of income or profit shifting between multinational parents and subsidiaries and how it changes in response to a tax reform in the United States. Profit shifting can occur in many ways, including the relocation of intangibles, the use of transfer pricing, and the use of loans between subsidiaries that facilitate earnings stripping. However, we simplify the analysis by modeling only the total amount of profit shifting, and restrict such profit shifting to the above-normal earnings of highly mobile firm-specific capital rather than extending profit shifting to all capital earnings.

An important parameter in our simulation analysis is the fraction of corporate income tax revenue lost due to profit shifting in the initial equilibrium. As described by Clausing (2016) and Dharmapala (2014), there is considerable disagreement on the magnitude of this revenue loss and the sensitivity of profit shifting to tax rate differentials. The recent work of Clausing (2016), which relies on BEA gross income and foreign investment earnings data, indicates that income shifting has been increasing in recent years, and that in 2012 the revenue loss due to profit shifting was between 32 percent and 46 percent of actual corporate revenues.\textsuperscript{22} By comparison, Zucman (2014) uses national income accounts and balance of payments data to estimate a revenue loss of 20 percent of corporate revenues in 2013. It should be noted that some other studies, as described in recent reviews by Dharmapala (2014) and Heckemeyer and Overesch (2013), suggest that income shifting is less pervasive than suggested by these analyses, especially the work of Clausing. However, Clausing (2016) argues that these analyses are suspect because they rely on data that “has extremely limited information on tax haven countries...”

\textsuperscript{21} Grubert and Altshuler (2013) analyze the costs of deferring profits abroad.

\textsuperscript{22} Clausing notes that the 46 percent figure is likely an overestimate because the BEA data on gross income by US MNC foreign affiliates used double-counts some equity investment income, while the 32 percent figure is likely an underestimate because the BEA data on direct investment earnings used ignore such investment income. Both figures may also be understated because they are calculated under the assumption that shifted income would have been taxed at a 30 percent rate rather than the statutory corporate tax rate of 35 percent. Note that these figures are expressed relative to corporate revenues after profit shifting; the analogous figures relative to corporate revenues before income shifting are 31 percent and 24 percent.
… [and thus] excludes many of the observations that are driving most of the income shifting behavior.” And Dharmapala (2014), while stressing the advantages of the micro-based analyses that form the bulk of the papers analyzed by Heckemeyer and Overesch (2013), also notes that these findings are inconsistent with the apparently large amount of observed income shifting activity. For example, Keightley and Stupak (2015) estimate that roughly half of foreign profits earned by US MNCs in 2012 were reported in seven of the most popular tax havens, while Gravelle (2015) shows that the foreign profits of US MNCs reported in tax havens far exceed their total GDP; these results provide compelling evidence of significant income shifting (although some of these profits reflect income shifting from high tax foreign countries rather than income shifting from the United States). In our simulation analysis, we adopt the relatively conservative assumption that the current corporate income tax revenue loss due to profit shifting is 30 percent of actual revenues (or 23 percent of revenues before income shifting).23

In addition, we must specify the effect on income shifting of the HRTP. As noted above, the shift to a destination-based corporate tax in principle should eliminate most current avenues for income shifting, at least for income shifting related to the profits of multinationals located in the United States that are earned from domestic sales. These avenues would include transfer pricing schemes, the use of loans for earnings stripping, and the allocation of the ownership of assets including intangibles to low-tax countries, since such foreign transactions would no longer affect the corporate tax base as receipts for export sales are not included in the tax base and deductions for imported inputs (and for interest expense) are denied.24 However, other avenues for tax avoidance and evasion – presumably including many not yet envisioned – could very well reduce revenues. These might include disguising domestic sales as export sales or disguising foreign input purchases as domestic purchases. In addition, as discussed above, the conversion of individual labor income to relatively low-taxed pass-through business income could lose revenue, the reduction in the tax rates applied to pass through income might reduce evasion, and the estimate of the amount of corporate income currently shifted abroad that we use may be high.

23 A closely related issue is the sensitivity of profit shifting to tax rate differentials. Clausing estimates that the (negative of the) tax semi-elasticity of profits shifted to low-tax jurisdictions ranges between 1.85 and 4.61, with an average estimate of 2.92. In marked contrast, Heckemeyer and Overesch (2013) conclude that the consensus estimate of the studies they analyze is 0.8. Using tax return data on US MNCS that Clausing (2016) describes as “the best possible data available,” Dowd, Landefeld, and Moore (2016) stress that profit shifting responses are much larger for large tax differentials; they estimate tax semi-elasticities of 0.7 for high-rate countries but 4.7 for low-rate tax havens.

24 Note that even in the absence of a move to a destination-based tax, the reduction in the corporate tax rate to 20 percent under the HRTP would dramatically reduce incentives for profit shifting, especially if the tax sensitivity of profit shifting is highly non-linear as suggested by Dowd, Landefeld, and Moore (2016).
For these reasons, rather than assuming that income shifting is completely eliminated with the movement to a DBCFT, we instead assume that 75 percent of income shifting is eliminated.

Finally, as noted above, our analysis assumes that foreign governments do not react to lower corporate income tax rates in the US by lowering their own tax rates. Thus, to the extent that such a reaction would occur (e.g., some countries in the EU might further reduce their corporate income tax rates and make up the revenue with increases in their value-added taxes), our results overstate the economic benefit to the US from enactment of the HRTP. For example, such rate reductions in other countries did occur after the US reduced its corporate tax rate from 48 percent to 34 percent in the Tax Reform Act of 1986. However, that reform made the US a relatively low rate country, while the rate reductions envisioned in the HRTP would make the US corporate income tax rate, including taxation of corporate income at the state level, roughly comparable to those in many other OECD countries. It would thus seem less likely – although certainly not impossible – that such a US rate reduction would result in a further round of significant corporate income tax rate reductions in the other industrialized countries.

IV. SIMULATION RESULTS

Our simulation results for the House Republican Tax Plan are shown in Table 1. These results show the percentage changes in the variables listed as a result of the reform, relative to a steady state in which the current tax system is left unchanged.

The simulation results indicates that GDP increases by 1.3 percent two years after the enactment of the HRTP, by 1.6 percent after 5 years, by 1.8 percent after 10 years, by 2.5 percent after 20 years, by 3.1 percent fifty years after reform, and by 3.3 percent in the long run, relative to the initial steady state. Consumption follows a similar pattern, increasing by 1.9 percent two years after reform, by 2.1 percent after 10 years, by 2.6 percent after 20 years, and by 3.4 percent in the long run.

These gains are partly attributable to an increase in domestic investment in ordinary capital in response to more favorable tax treatment under the HRTP. Domestic investment increases by 2.6 percent in the second year after reform, by 4.9 percent after 10 years, by 6.3 percent after 20 years, and by 8.5 percent in the long run. These increases in the domestic capital stock are initially supplemented by increases in imports of ordinary capital, but these increases in
imported capital are eventually reversed with the accumulation of domestic capital. Specifically, imports of ordinary capital increase by 1.7 percent two years after the enactment of the reform, by 1.3 percent after 10 years, and by 0.5 percent after 20 years, and then decline by 1.7 percent 50 years after the enactment of reform and by 4.4 percent in the long run. The net effect on the US capital stock, however, is always positive and increasing, as the stock of ordinary capital in the United States increases by 0.1 percent two years after the enactment of reform, by 0.7 percent after 5 years, by 1.3 percent after 10 years, by 3.2 percent after 20 years, by 6.0 percent fifty years after reform, and by 7.2 percent in the long run.

The reallocation of firm-specific capital (FSK) from the rest of the world to the United States follows the same general pattern as imports of ordinary capital, as FSK initially increases, but the increases decline over time as the expansion of supply in the multinational sector drives down the price of output and thus returns to FSK, and as the domestic capital stock increases to some extent, crowding out FSK (which is treated in our model as a separate production input in the Cobb-Douglas production function in the multinational sector). For example, FSK is 5.7 percent higher two years after reform and 8.6 percent higher after 5 years, but these increases decline to 7.8 percent after 10 years, 5.7 percent after 20 years, and 1.4 percent in the long run.

The net result of all of the reform-induced changes in domestic saving and international capital and goods flows is that net exports increase, with exports increasing and imports declining. (Recall that the border adjustments under the HRTP have no effect on trade in our model.) For example, exports increase by 13.1 percent two years after the enactment of reform, by 15.4 percent after 5 years, by 11.3 percent after 20 years, and by 5.9 percent in the long run, while imports decrease by 2.7 percent two years after the enactment of reform, by 3.4 percent after 5 years, by 6.2 percent after 20 years, and by 11.6 percent in the long run. Note that the resulting increase in net exports implies that the revenue gain from border adjustments is significantly diminished.

Of considerable importance in determining the effects of the reform is the extent to which corporate rate reduction coupled with border adjustments result in a reversal of income shifting to relatively low tax jurisdictions. This effect is an especially beneficial aspect of the reform as it

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25 Note that under our assumption of full exchange rate adjustment in response to the border adjustments under the HRTP, the reform would not increase the cost of imports of ordinary capital relative to domestic capital even though such imported inputs would not be deductible under the corporate income tax.

26 Note, however, that our model does not capture explicitly the extent to which exports reflect income shifting on sales to US consumers that would be eliminated with border adjustments under the HRTP and would thus result in additional revenues.
allows further rate reduction without incurring any costs such as those associated with base broadening. As discussed above, we assume that the enactment of the HRTP with its border adjustments that greatly reduce incentives for income shifting reduces the amount of income shifting by 75 percent.

The effects of reform on labor supply reflect several competing factors. The reform-induced increase in the stocks of ordinary capital and FSK imply that labor productivity and wages increase. The resulting increase in the return to work tends to result in an increase in labor supply. However, standard consumer theory also predicts that increases in income, from either higher wages or any other sources, lead consumers to increase their demand for both goods and leisure; that is, the income effects associated with higher wages and other increases in income imply greater leisure demand and thus less labor supply. Finally, the income effects associated with the changes in transfer payments that are used to balance the government budget in each period beginning with year 11 after the enactment of reform also affect labor supply as described above.

In the simulation, the net impact of these various effects is positive, as total hours worked increase by 1.5 percent after 2 years, by 1.4 percent after 5 years, by 1.5 percent after 10 years, and by 1.1 percent in the long run. The reform also causes labor compensation to increase by 0.4 percent after 2 years, by 1.3 percent after 10 years, by 2.3 percent after 20 years, and by 4.6 percent in the long run. After declining modestly initially, the real wage increases by 0.9 percent 20 years after the enactment of reform and by 3.5 percent in the long run. However, the effects of the reform on real after-tax wages, which reflect the effects of both the change in wages and in individual tax rates, are always positive, with an increase of 1.7 percent two years after the enactment of reform, 2.2 percent after five years, 3.6 percent after 20 years, and 6.3 percent in the long run. Thus, the increase in labor demand due to the reform appears primarily as an increase in wages rather than as an increase in hours worked, largely because the model assumes full employment. If instead the model allowed for unemployment in the labor market, then some of the reform-induced increase in the demand for labor would result in less unemployment and thus more hours worked, coupled with a smaller increase in the real wage (note that by definition the sum of the percentage changes in wages and hours worked must equal the percentage change in compensation).

Finally, government debt increases to offset the revenue losses due to the enactment of the HRTP, after taking into account the dynamic effects described above. Specifically, the government debt-GDP ratio increases from 74.5 percent in the initial equilibrium to 80.1 percent ten years after the enactment of reform. Beginning in the 11th year after enactment (not shown in the table), total government transfers decline by 9.1 percent; they then decline uniformly, with a decrease of 1.4 percent 20 years after enactment and 0.1 percent 25 years after enactment. Government transfers begin increasing in the 26th year after enactment with an increase of 0.1
percent, with subsequent increases of 2.8 percent 50 years after enactment and 4.3 percent in the long run. The present value of the transfer decreases in years 11 to 25, calculated in the year of enactment, is $271.8 billion, while the present value of the transfer increases beginning in year 26 is $773.8 billion. Thus, the net present value of the changes in total government transfers is strongly positive, so that the government could in principle use debt policy to avoid any reduction in transfers in years 11 through 25, while still having revenues available to reduce the debt-GDP ratio in the longer term.
Table 1.
Macroeconomic Effects of the House Republican Tax Plan – 10-Year Government Debt Offset Followed by Government Transfer Offset
(Percentage changes in variables, relative to steady state with no reform)

<table>
<thead>
<tr>
<th>Variable</th>
<th>% Change in Year:</th>
<th>2</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>50</th>
<th>LR</th>
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</thead>
<tbody>
<tr>
<td>GDP</td>
<td></td>
<td>1.3</td>
<td>1.6</td>
<td>1.8</td>
<td>2.5</td>
<td>3.1</td>
<td>3.3</td>
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<tr>
<td>Consumption</td>
<td></td>
<td>1.9</td>
<td>2.0</td>
<td>2.1</td>
<td>2.6</td>
<td>3.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Investment in ordinary K in US</td>
<td></td>
<td>2.6</td>
<td>4.2</td>
<td>4.9</td>
<td>6.3</td>
<td>7.8</td>
<td>8.5</td>
</tr>
<tr>
<td>Imports of ordinary K into US</td>
<td></td>
<td>1.7</td>
<td>1.5</td>
<td>1.3</td>
<td>0.5</td>
<td>–1.7</td>
<td>–4.4</td>
</tr>
<tr>
<td>Stock of ordinary K in US</td>
<td></td>
<td>0.1</td>
<td>0.7</td>
<td>1.3</td>
<td>3.2</td>
<td>6.0</td>
<td>7.2</td>
</tr>
<tr>
<td>Stock of FSK in US</td>
<td></td>
<td>5.7</td>
<td>8.6</td>
<td>7.8</td>
<td>5.7</td>
<td>3.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Exports</td>
<td></td>
<td>13.1</td>
<td>15.4</td>
<td>14.3</td>
<td>11.3</td>
<td>7.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Imports</td>
<td></td>
<td>–2.7</td>
<td>–3.4</td>
<td>–4.3</td>
<td>–6.2</td>
<td>–9.1</td>
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<td>Employment (hours worked)</td>
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<td>1.5</td>
<td>1.4</td>
<td>1.5</td>
<td>1.4</td>
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<td>1.1</td>
</tr>
<tr>
<td>Labor compensation</td>
<td></td>
<td>0.4</td>
<td>0.9</td>
<td>1.3</td>
<td>2.3</td>
<td>3.9</td>
<td>4.6</td>
</tr>
<tr>
<td>Real wage</td>
<td></td>
<td>–1.0</td>
<td>–0.6</td>
<td>–0.2</td>
<td>0.9</td>
<td>2.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Real after-tax wage</td>
<td></td>
<td>1.7</td>
<td>2.2</td>
<td>2.6</td>
<td>3.6</td>
<td>5.4</td>
<td>6.3</td>
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<tr>
<td>Government transfers</td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>–1.4</td>
<td>2.8</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Notes:
Corporate income tax rate in the US: 20 percent
Maximum income tax rate on pass-through income: 25 percent
Assumed reduction in income shifting: 75 percent
V. CONCLUSION

In response to widespread concerns that the income tax system in the United States is highly inefficient, unfair, unnecessarily complicated, and discourages economic growth while putting US multinational companies at a disadvantage relative to their foreign competitors, numerous proposals for sweeping tax reforms have been advanced in recent years. One of the most prominent examples is the proposal for business and individual tax reform put forth by House Speaker Paul Ryan (R-WI) and Chair of the House Ways and Means Committee, Rep. Kevin Brady (R-TX), commonly referred to as the House Republican Tax Plan (HRTP). In this study, we report the results of a numerical simulation of the macroeconomic effects of the HRTP using the DZ model, a dynamic overlapping generations, computable general equilibrium model designed to analyze both the short-run and long-run macroeconomic effects of tax reforms in the United States.

The HRTP proposes dramatic changes in both business and individual level taxation in the United States that are designed to address many of the problems outlined above. In particular, it would reduce business tax rates dramatically, tax businesses on a cash-flow basis (allowing expensing rather than deductions for depreciation and eliminating deductions for the interest on debt-financed investment), and introduce a destination-based territorial business tax that would include new “border adjustments” – the element of the proposal that has generated the most controversy. The border adjustments would deny business deductions for imported production inputs, apply tax to all direct purchases by consumers of imported goods, and exclude from the cash flow tax base all receipts from export sales. Individual income tax rates on both labor and capital income would also be lowered, coupled with increases in standard deductions, the elimination of personal exemptions, and the elimination of various deductions, exemptions, and other tax preferences.

In this study, we report the results of a numerical simulation of the macroeconomic effects of the HRTP, using the Diamond-Zodrow model, under the assumption that increases in government debt are used to offset the deficits due to the enactment of the HRTP for the first ten years following enactment, with subsequent deficits/surpluses offset with changes in total government transfers. We focus solely on aggregate macroeconomic effects and do not take into account the distributional implications of the reform.

The simulations suggest that the net macroeconomic effects of enacting the HRTP would be positive, with an increase in GDP of 1.8 percent ten years after the enactment of reform and 3.3 percent in the long run. These increases are attributable to many factors, including an increase in domestic investment, a reallocation of firm-specific capital that earns above normal economic rents to the United States, and a sizable reversal of income shifting, as well as modest increases in labor supply and larger increases in labor compensation. These results suggest that
enactment of the HRTP would have positive net effects on the macroeconomic performance of the US economy.

We conclude with some caveats. In our view, dynamic, overlapping generations computable general equilibrium models of the type used in this analysis are one of the best tools available to analyze the real economic effects of tax policy changes such as the House Republican Tax Plan analyzed in this study, as they provide a rich structure based on fundamental economic theory that captures many of the complex and interacting effects of potential tax reforms, including the dynamic effects of reform. Nevertheless, it is clear that the estimated effects of the HRTP presented in this report reflect the results of a particular simulation within the context of a specific computable general equilibrium dynamic economic model. The results of any study that attempts to model the effects of corporate and individual income tax reform in today’s highly complex and internationally integrated economy are at best suggestive, and this report is no exception. Such results depend on the details of the reform proposed as well as a wide variety of structural assumptions in the model and the specific model parameters that are utilized. An analysis of the sensitivity of our results to variations in model structure and parameter values is the subject of ongoing research.
REFERENCES


APPENDIX

Table A1. Parameter Values Used in the Diamond-Zodrow Model

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho$</td>
<td>Rate of time preference</td>
<td>0.015</td>
</tr>
<tr>
<td>$\sigma_U$</td>
<td>Intertemporal elasticity of substitution (EOS)</td>
<td>0.40</td>
</tr>
<tr>
<td>$\sigma_C$</td>
<td>Intratemporal EOS</td>
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<tr>
<td>$\sigma_H$</td>
<td>EOS between composite good, housing</td>
<td>0.30</td>
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<tr>
<td>$\sigma_N$</td>
<td>EOS between corporate composite good and noncorporate good</td>
<td>2.00</td>
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<tr>
<td>$\sigma_{NS}$</td>
<td>EOS between subsidized and nonsubsidized noncorporate good</td>
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<tr>
<td>$\sigma_M$</td>
<td>EOS between M-sector and C-sector corporate goods</td>
<td>2.00</td>
</tr>
<tr>
<td>$\sigma_I$</td>
<td>EOS between domestic and foreign produced goods</td>
<td>5.00</td>
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<tr>
<td>$\sigma_R$</td>
<td>EOS between rental and owner-occupied housing</td>
<td>1.50</td>
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<tr>
<td>$\alpha_C$</td>
<td>Utility weight on the composite consumption good</td>
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<td>$\alpha_H$</td>
<td>Utility weight on non-housing consumption good</td>
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<td>$\alpha_{NS}$</td>
<td>Utility weight on subsidized non-corporate consumption good</td>
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<tr>
<td>$\alpha_N$</td>
<td>Utility weight on composite corporate good</td>
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<td>$\alpha_M$</td>
<td>Utility weight on M-sector corporate good</td>
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<td>$\alpha_R$</td>
<td>Utility weight on owner-occupied housing</td>
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<tr>
<td>$\alpha_{LE}$</td>
<td>Leisure share of time endowment</td>
<td>0.40</td>
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### Production Function Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>$\varepsilon_C, \varepsilon_M$</td>
<td>EOS for C-sector and M-sector corporate goods</td>
<td>1.00</td>
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<tr>
<td>$\varepsilon_N$</td>
<td>EOS for noncorporate good</td>
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<tr>
<td>$\varepsilon_H, \varepsilon_R$</td>
<td>EOS for owner and rental housing</td>
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<tr>
<td>$\gamma_C$</td>
<td>Capital shares for C-sector corporate goods</td>
<td>0.27</td>
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<tr>
<td>$\gamma_N$</td>
<td>Capital share for noncorporate good</td>
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<tr>
<td>$\gamma_H, \gamma_R$</td>
<td>Capital share for owner and rental housing</td>
<td>0.98</td>
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<tr>
<td>$\beta_X, \beta_N, \beta_H$</td>
<td>Capital stock adjustment cost parameters</td>
<td>5.0, 10</td>
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<tr>
<td>$\zeta$</td>
<td>Dividend payout ratio in corporate sector</td>
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<tr>
<td>$b_C, b_N, b_H, b_R$</td>
<td>Debt-asset ratios</td>
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<tr>
<td>$\beta_d$</td>
<td>Cost of excessive debt parameter</td>
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<tr>
<td>$\gamma_{KM}$</td>
<td>Capital share parameter in M-sector composite $KEL$ factor</td>
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<td>$\gamma_{MK}$</td>
<td>$KEL$ share parameter in M-sector production function</td>
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<tr>
<td>$\gamma_{MI}$</td>
<td>Intermediate good share in M-sector production function</td>
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### Other Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
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<tr>
<td>$\varepsilon_K$</td>
<td>Portfolio elasticity for ordinary capital</td>
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<tr>
<td>$\varepsilon_{FSK}$</td>
<td>Portfolio elasticity for firm-specific capital</td>
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<tr>
<td>$f_{IS}$</td>
<td>Share of profits shifted abroad as a fraction of corporate profits</td>
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<tr>
<td>$n$</td>
<td>Exogenous growth rate (population plus productivity)</td>
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