Macroeconomic Effects of Lower Corporate Income Tax Rates Recently Enacted Abroad

Prepared for the Reforming America's Taxes Equitably (RATE) Coalition

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Executive summary

This report estimates the effects on the US economy of the lower corporate income tax (CIT) rates enacted in the other major OECD countries over the past three decades. These rate reductions, which reflect the responses of the major industrialized countries to the combination of economic globalization and increasing tax competition among nations, have served as a major catalyst for current proposals to lower the CIT rate in the United States.
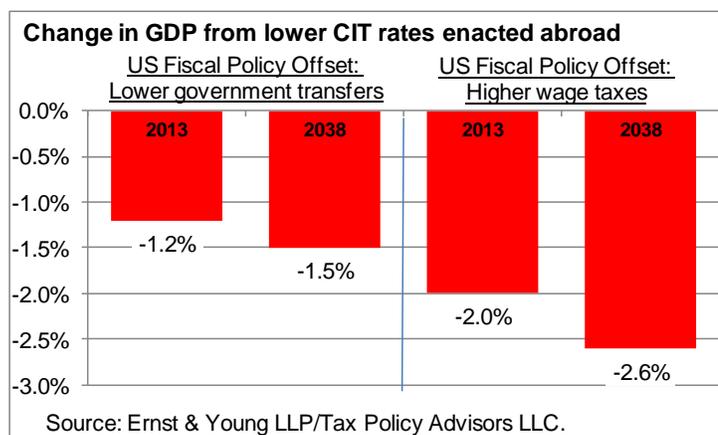
Based on the 19 OECD countries analyzed, the report finds that the US statutory CIT rate is now significantly higher than those of our international competitors:

- The average statutory foreign CIT rate abroad (weighted by gross domestic product (GDP) and including both national and subnational CIT rates) will have fallen from 45.4% to 29.6% – a nearly 35% decline – between 1988 and 2015, when all currently scheduled changes will be fully in effect.
- In 2015, the average foreign statutory CIT rate (weighted by GDP and including both national and subnational CIT rates) of 29.6% will be more than 24% lower than the current 39.0% combined federal and average state statutory CIT rate in the United States. In contrast, in 1988, the average foreign statutory CIT rate was more than 17% higher than the combined 38.6% statutory US CIT rate.

Several channels through which the CIT rate can affect economic performance are considered. First, a decline in foreign statutory CIT rates – assuming that it is not offset by other provisions such as less generous deductions for depreciation – lowers the cost of capital abroad, which encourages investment abroad instead of in the United States. Second, a high US CIT rate relative to those in other countries affects the US CIT base in ways that amplify negative effects of a relatively high CIT rate on investment. Third, the relatively high US CIT rate discourages foreign direct investment (FDI) in the United States. The resulting decline in the US capital stock attributable to these three factors contributes to lower labor productivity and, ultimately, lower living standards than would otherwise occur.

The report estimates that the reductions in the CIT rate enacted abroad over the past several decades are having an adverse effect on the US economy. The estimated impacts are significant in both scenarios considered, which assume two different methods for financing the lower level of US government revenues associated with the reduction in US GDP due to lower tax rates abroad – a reduction in government transfers or higher wage taxes:

- US GDP is estimated to be between 1.2% and 2.0% smaller in 2013, depending on how the lower federal revenues resulting from the estimated decline in US GDP are financed.
- In the long-run, the US economy, as measured by US GDP, would be smaller by between 1.5% and 2.6% if the current differences in CIT rates remain.[*]

Change in GDP from lower CIT rates enacted abroad

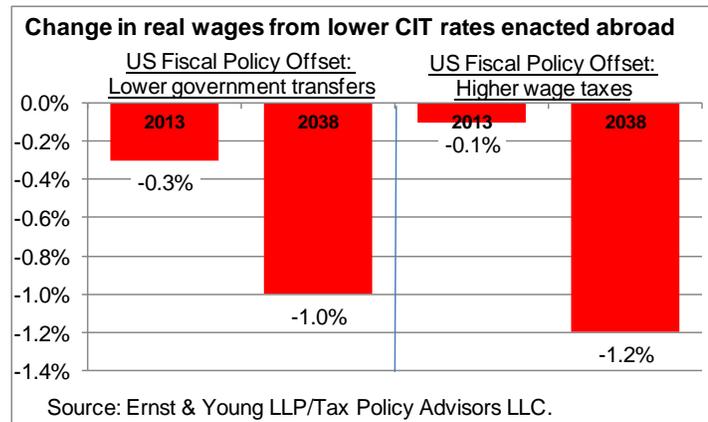Source: Ernst & Young LLP/Tax Policy Advisors LLC.

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[*] The long-run estimates are for 2038. Models of this type typically find that about two-thirds to three-quarters of the long-run changes in output are attained within 10 years.

- In today's $15.7 trillion global economy, this long-run impact on the US economy is equivalent to a reduction in US GDP of roughly $235 billion to $345 billion each year.

The report also finds adverse effects on US economic performance under different assumptions regarding the sensitivity of capital outflow to higher taxes, with US GDP falling by at least 1.3% in the long-run under a range of assumptions.

Finally, the report also finds that the high US CIT rate in the face of declining CIT rates abroad has resulted in a decline in US living standards as measured by real wages:

- Depending on the financing assumption, real wages are found to be about 0.1% to 0.3% lower than they would have been otherwise in 2013.

- In the long-run, real wages would be about 1.0% to 1.2% lower than they would have been otherwise.

Change in real wages from lower CIT rates enacted abroad

	US Fiscal Policy Offset: Lower government transfers		US Fiscal Policy Offset: Higher wage taxes	
	2013	2038	2013	2038
	-0.3%	-1.0%	-0.1%	-1.2%

Source: Ernst & Young LLP/Tax Policy Advisors LLC.

These estimates suggest that the current high US CIT rate is beginning to have significant adverse economic consequences for the US economy and American workers and suggest that reform of the US CIT that includes a significant reduction in the CIT rate would likely provide important economic benefits to the United States.

Macroeconomic Effects of Lower Corporate Income Tax Rates Recently Enacted Abroad

I.   Introduction

The much celebrated Tax Reform Act of 1986 (TRA86) included a dramatic reduction in the federal statutory corporate income tax (CIT) rate, as the top rate declined from 46% to 34%, resulting in a statutory rate in the United States that was relatively low in comparison to the rates of its major trading partners. However, apart from a minor increase in the top CIT rate to 35% in 1993 and the enactment of various temporary stimulus provisions such as bonus depreciation, the CIT in the United States has remained roughly unchanged since TRA86.

In contrast, most other developed countries have been steadily reducing their statutory CIT rates over the past 25 years. Based on the 19 OECD countries analyzed in this report, the average statutory foreign CIT rate abroad (weighted by gross domestic product (GDP) and including both national and subnational CIT rates) will have fallen from 45.4% to 29.6% – a nearly 35% decline – between 1988 and 2015 (when all currently scheduled changes will be fully in effect). Further, by 2015, the average foreign statutory CIT rate (weighted by GDP and including both national and subnational CIT rates) of 29.6% will be more than 24% lower than the current 39.0% combined federal and average state statutory US CIT rate. In contrast, in 1988, the average foreign statutory CIT rate was more than 17% higher than the combined 38.6% statutory US CIT rate.

The reductions in CIT rates abroad were prompted in large part by the inexorable forces of globalization and increasing international tax competition as countries attempt to retain and attract highly mobile capital investments by large US and foreign multinational corporations (Zodrow, 2010). Indeed, the high US statutory CIT rate has sparked concerns about the extent to which the US tax system makes it more difficult for US multinationals to compete successfully in the modern world economy.

This report analyzes the impact of the reductions in CIT rates abroad on the US economy during the 1988 through 2015 period. The analysis takes into account not only the decline in statutory CIT rates abroad, but also other base-broadening changes in other countries' tax systems made to offset the revenue reductions attributable to the lower statutory corporate tax rates.

These trends have been the subject of much recent discussion in both policymaking and academic circles. In particular, they were the focus of a report prepared by the US Treasury (2007) on business tax competitiveness and reform, and have sparked various recent proposals for reforms that would reduce the CIT rate in the United States, including the Administration's *Framework for Business Tax Reform* and the reports of the Simpson-Bowles commission (National Commission of Fiscal Responsibility and Reform, 2010) and the Rivlin-Domenici commission (Bipartisan Policy Center, 2010).[1]

This report considers several channels through which the declines in foreign CIT rates can affect US economic performance. First, the decline in foreign statutory CIT rates – assuming

that it is not offset by other provisions such as less generous deductions for depreciation – lowers the cost of capital abroad, which encourages US MNCs to invest abroad instead of in the United States. Second, a high US statutory CIT rate relative to those in other countries affects the US CIT base through the shifting of income and deductions, which amplifies the negative effects of a relatively high CIT rate on investment. Third, the relatively high US CIT rate discourages foreign direct investment (FDI) in the United States. The resulting decline in the US capital stock attributable to these three factors contributes to lower labor productivity and, ultimately, lower living standards than would otherwise occur.

This report discusses the results of simulations of the effects of the reduction in foreign CIT rates over the past several decades on the US economy using a dynamic computable general equilibrium model (the "Tax Policy Advisers Model" or "TPA Model") that takes into account tax-induced international capital flows as well as the shifting of income and deductions among countries.

The report estimates that the reductions in the CIT rate enacted abroad over the past several decades are having an adverse effect on the US economy. The estimated impacts are significant in both scenarios considered, which assume two different methods for financing the lower level of US government revenues associated with the reduction in US GDP due to lower tax rates abroad – a reduction in government transfers or higher wage taxes. US GDP is estimated to be between 1.2% and 2.0% smaller in 2013, depending on how the lower federal revenues resulting from the estimated decline in US GDP are financed. In the long-run, the US economy, as measured by US GDP, is estimated to be smaller by between 1.5% and 2.6% if the current differences in CIT rates remain.[2]

The report also finds that the high US CIT rate in the face of declining CIT rates abroad has resulted in a decline in workers' real wages. Depending on the financing assumption, real wages are estimated to be about 0.1% to 0.3% lower than they would have been otherwise in 2013. In the long-run, real wages are estimated to be about 1.0% to 1.2% lower than they would have been otherwise.

These estimates suggest that the current high US CIT rate is beginning to have significant adverse economic consequences for the US economy and American workers and suggest that reform of the US CIT that includes a significant reduction in the CIT rate would likely provide important economic benefits to the United States.

II.   Changes in corporate income tax rates abroad

Both statutory and effective corporate income tax rates around the world have declined significantly since passage of the TRA86 in the United States. This is documented in Figures 1 and 2 below, which portray CIT rates for the United States and the 18 other OECD countries for which consistent data were available over the period from 1988 through 2015.[3] The estimates for the "rest of world" reflect GDP-weighted averages of the CIT rates in each country. The 19 countries analyzed currently account for 61% of the world's GDP.[4] Several aspects of these trends and the modeling approach used in this report are noteworthy.

First, prior macroeconomic analyses of potential CIT reforms in the United States have represented the changes in the CIT rate and CIT base through their effect on the marginal effective tax rate (METR).[5] This measure reflects the tax applied to a hypothetical marginal or "break even" corporate investment, taking into account certain provisions of the tax system, such as the CIT rate, tax depreciation allowances, and investment tax credits, that affect investment incentives.[6]

In contrast, this report uses two different measures of CIT rates to account for changes in CIT systems: 1) the statutory tax rate (STR), including the effects of any sub-national CITs, and 2) the METR, calculated as a weighted average of the METR for debt and equity finance and for investment in equipment, structures, land, and inventories.[7]

Changes in statutory CIT tax rates have an effect on marginal investment decisions as reflected through their impact on the METR, an effect captured in the prior analyses noted above, but can also have effects on the location of certain investments, such as foreign direct investment, as well as on the location of income and deductions. By separately modeling marginal investment and other decisions, this report is able to more fully account for the effects of CIT changes on the US economy. More generally, accounting for changes in the METR also has the advantage of capturing some of the choices, such as reducing deductions for depreciation, that other countries have made in deciding how to offset the revenue losses due to reductions in statutory CIT rates.

As shown in Figure 1, the combined federal-state US statutory CIT rate has remained largely unchanged since the TRA86, aside from the 1% increase in the federal statutory CIT rate enacted in 1993. The GDP-weighted average statutory CIT rates for the other 18 OECD countries analyzed abroad has declined from 45.4% in 1988 to 30.7% in 2012. Already-scheduled changes in the CIT rate for several countries will further reduce the average CIT statutory tax rate to 29.6% by 2015, as compared to the current 39% combined federal-state CIT rate in the United States. For example, Great Britain is scheduled to reduce its CIT rate to 21% by 2014. Similarly, Japan recently reduced its primary federal CIT rate from 30% to 25.5%, while enacting a temporary 10% surcharge related to the 2011 earthquake and tsunami. Between 2014 and 2015, the combined CIT rate in Japan will fall from 38% to 35.6% when the temporary surcharge expires. With these recent scheduled changes, the statutory CIT rate for the 18 countries analyzed will have fallen by nearly 35% between 1988 and 2015.

Figure 1. Statutory CIT rates in the United States and the "Rest of World," 1988-2015
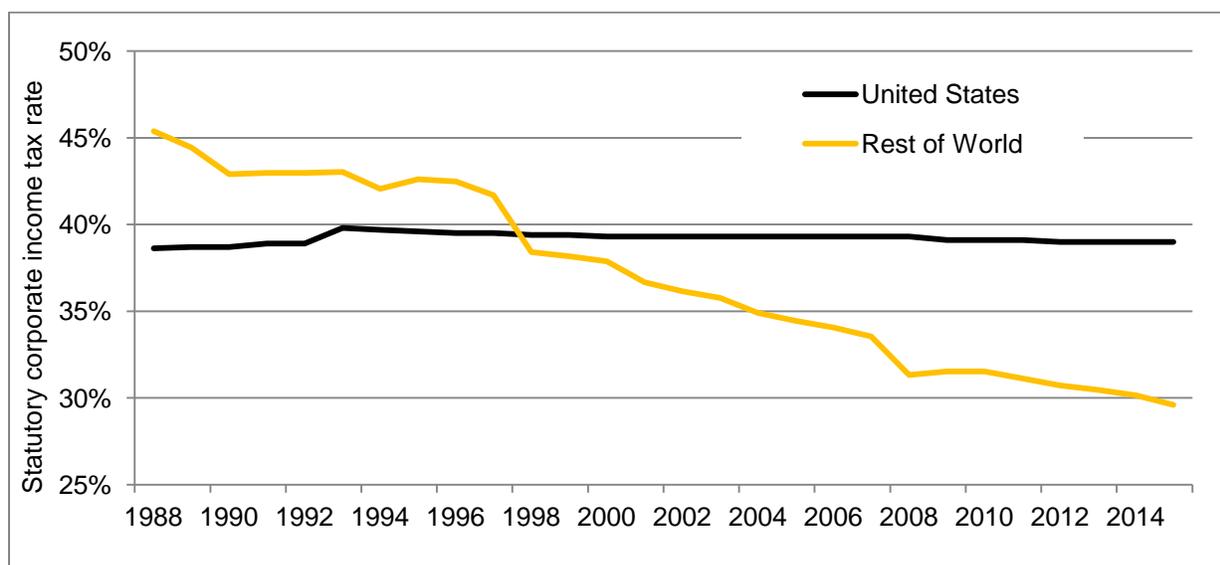
Notes: The average statutory CIT rate for the "rest of world" is weighted by the GDP of the 18 included countries: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom. The tax rates include both national and subnational CIT rates.
Source: Organisation for Economic Co-operation and Development; Bilicka and Devereux (2012); and Ernst & Young LLP.

Figure 1 indicates that in 1988, the first year the TRA86 was fully phased in and the year the analysis embodied in this report begins, the US combined statutory rate was 38.6%, 6.8 percentage points lower than the GDP-weighted average statutory rate of 45.4% for the other 18 OECD countries. However, by 2015, the US statutory tax rate of 39.0% will be 9.4 percentage points higher than the projected 18-country average rate of 29.6%, reflecting a swing of more than 16 percentage points in relative statutory CIT rates.

Second, at the same time statutory CIT rates have fallen abroad, many countries have also broadened their CIT bases or increased reliance on value-added taxes (VATs). The decline in the present value of depreciation allowances, especially for new investment in buildings, for example, was recently documented by Bilicka and Devereux (2012). The METR concept used in this report captures these changes in the CIT base, as well as certain other features of the CIT.[8] By capturing the effects of both changes in the CIT rate and other elements of CIT systems, the METR captures the tradeoffs that countries have made in financing the reductions in their CIT rates.[9]

Third, as shown by the trend for corporate METRs shown in Figure 2, even though the United States now has a METR that is similar to the other countries analyzed, the average METR abroad has fallen over this period. This relative decline in the foreign METR is an important determinant of the level of investment, in addition to other factors, such as relative wages, educational levels, and the regulatory environment that also determine the competitiveness of a country's economy. In contrast, because the TRA86 was, in general, a base-broadening, rate-reducing reform, it left the corporate METR in the United States largely unchanged at 18.0%.

However, in relative terms, the corporate METR in the United States in 1988 was 6.9 percentage points below the 18-country GDP-weighted average corporate METR of 24.9%. By comparison, by 2015 the METR in the United States will be 20.2%, while the GDP-weighted average corporate METR among the 18 other OECD countries analyzed will have declined to 20.6%.

Figure 2. Marginal effective tax rate for new corporate investment in the United States and "Rest of World", 1988-2015
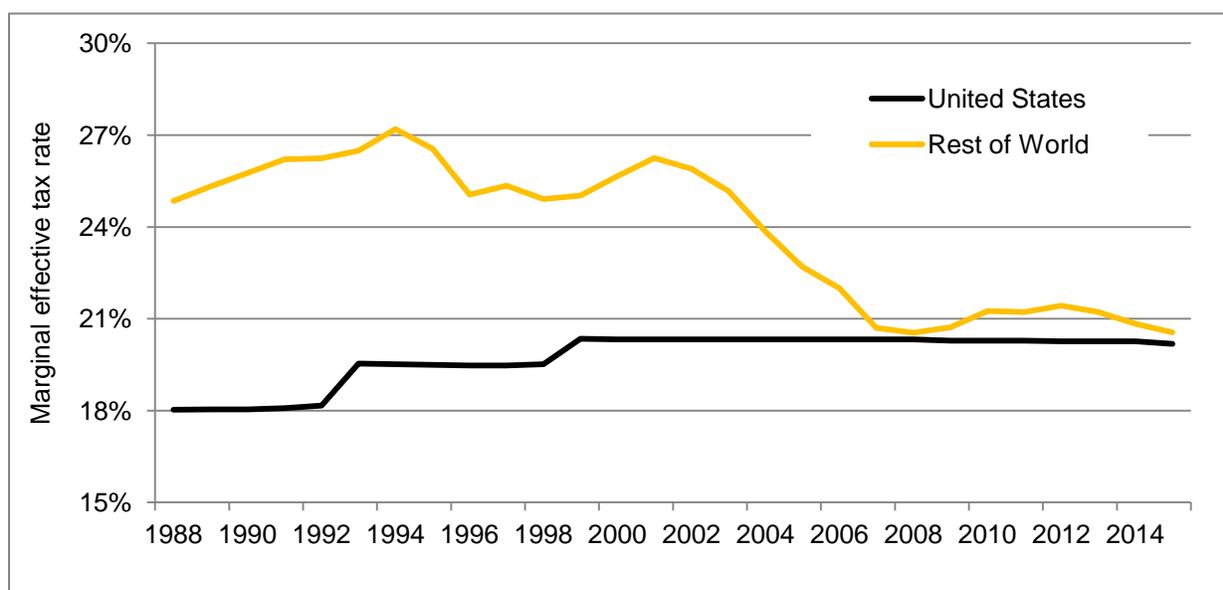
Notes: The METR for the "rest of world" is weighted by the GDP for each of the 18 included countries for which consistent data are available over this period: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom. The tax rates include both national and subnational CIT rates.

Source: Institute for Fiscal Studies; and calculations by Ernst & Young LLP/Tax Policy Advisers LLC.

The CIT rates this report uses to simulate the effects of the lower CIT rates enacted abroad focus on the 19 countries (including the United States) for which consistent data are available over the period from 1988 through 2015. A comparison of broader sets of countries to the United States in 2012 indicates a similar gap in CIT rates, with a GDP-weighted average statutory CIT rate of 30.0% for all of the OECD countries (excluding the United States) and 28.6% for the top 50 economies (excluding the United States). In addition, the CIT statutory tax rate gap in 2012 is larger if the foreign rate is calculated on an unweighted basis, with a 25.0% average CIT rate for the OECD (excluding the United States) and 25.4% average CIT rate for the top 50 economies (excluding the United States).

A recent study comparing METRs that includes all OECD countries and also includes the effects of other taxes on the METR, such as investor-level taxes, property taxes, and VATs assessed on intermediate inputs, suggests a larger gap than the METR estimates used in this report. Chen and Mintz (2012) report a METR for the United States of 35.6%, but a GDP-weighted average of 24.6% for the OECD (excluding the United States) and simple average of 19.0% for the OECD (excluding the United States).

Note that the CIT rates shown above do not include any additional US tax paid by US-MNC domestic parents upon repatriation of earnings from their foreign subsidiaries.

In addition, the analysis makes no attempt to capture two other factors that tend to increase tax incentives for investing abroad rather than in the United States. First, the analysis does not address the potential impact of the general movement of other developed nations toward territorial tax systems during this period. Second, it does not consider individual level taxation, especially the extent to which more complete integration of the business and individual level taxes in some foreign countries results in a lower combined business and individual level tax burden (although relatively high foreign individual level taxes on dividends and capital gains would act in the opposite direction).

III.   Tax sensitivity of foreign direct investment (FDI)

The high US CIT rate relative to other developed nations can be expected to have an adverse effect on US economic performance. The recent reduction in foreign CIT rates increases the relative attractiveness of investing abroad, all else equal, causing an outflow of capital from the United States that reduces the productive capacity of the US economy. The globalization of the modern economy plays an important role in these effects. Increasing globalization makes it easier for businesses and investors to reallocate or move their capital across borders in response to differences in countries' tax policies, which amplifies the detrimental effects of the high US CIT rate relative to other developed nations.

A recent OECD study (Johansson et al., 2008) concludes that, of all the different types of taxes, CITs are the most harmful to economic growth, due primarily to their effect on the rate of capital accumulation. The study notes that the adverse effects of the CIT increase with the openness of the economy.

Foreign direct investment (FDI) is an important channel through which such capital flows can be affected. The CIT can have a large impact on where multinational companies choose to locate their production facilities, as well as on the size of those investments.[10] Additional investment is important because it can spur additional local employment, increase productivity – which has positive spillovers to other segments of the local economy – and provide other benefits commonly associated with FDI. FDI in the United States has been estimated to support 5 million US jobs in 2010.[11]

A large body of research has attempted to quantify the impact of the CIT on FDI.[12] The consensus of this research is that FDI is sensitive to tax factors. For example, in a review of the empirical research on this issue, Gordon and Hines (2002) conclude that the "econometric work of the last fifteen years provides ample evidence of the sensitivity of the level and location of FDI to its tax treatment." Moreover, this sensitivity is increasing over time. For example, Altshuler, Grubert and Newlon (2001) estimate that the responsiveness of investment to the after-tax host country rates of return for US multinationals nearly doubled between 1984 and 1992, and Altshuler and Grubert (2006) report evidence of further increases during the 1990s.

One recent survey of this research (de Mooij and Ederveen, 2008) concluded that: (1) decisions regarding both the location and the level of investment are sensitive to tax factors, (2) investment in tangible property, such as plant and equipment, is more tax sensitive than aggregate FDI, which includes mergers and acquisitions, and (3) the tax responsiveness of FDI seems to be increasing over time. Another study stresses that location decisions involving investments that earn above-normal returns in theory should be much more affected by average effective tax rates (AETRs) (and thus largely by statutory tax rates (STRs) for investments that earn significant above-normal returns or economic rents) than by METRs (Devereux and Lockwood, 2006).[13]

This research suggests that the reductions in CIT rates abroad likely helped increase FDI in other countries and that these effects are increasing over time. Moreover, more recent research

suggests that AETRs and thus statutory CIT rates, rather than METRs (which are also influenced by the breadth of the CIT base), are the more relevant policy tool affecting FDI, primarily because statutory rates are more important in determining the tax burden on highly mobile investments that earn firm-specific economic rents (de Mooij and Ederveen, 2008, and Devereux and Lockwood, 2006). Statutory tax rates are also the most relevant tax rate in determining the extent of tax incentives for the shifting of income and deductions among countries with different CIT rates.

IV.   Overview of macroeconomic model and simulation approach

This report estimates the macroeconomic effects on the US economy of the reduction in foreign CIT rates observed since the US CIT rate cuts enacted in the TRA86 were fully phased in, within the context of the TPA simulation model of the US economy, assuming that all else is constant. The analysis is suggestive of the impact on the US economy of foreign CIT rate reductions occurring from 1988 through 2015, subject to the caveats noted below. A description of the basic TPA Model can be found in Diamond, Zodrow, Neubig and Carroll (2011), Diamond and Zodrow (2007, 2008), and Zodrow and Diamond (forthcoming). Several extensions related primarily to foreign capital flows are described briefly below.

The analysis is admittedly highly stylized in that it focuses entirely on the effects of foreign CIT rate cuts within the context of the TPA Model, with no attempt to account for all of the non-tax changes that occurred over the 1988 through 2015 time period. These factors include reductions in transportation costs, the information/communication revolution, the increasing importance of digital products, the loosening of international capital controls, the relative growth of non-developed economies, and reductions in worldwide trade barriers, all of which contributed to increased globalization of the world economy and affected the investment patterns of US and foreign multinationals. In addition, the use of corporate level statutory and marginal effective tax rates in the United States and the other 18 OECD countries analyzed to capture the tax incentives determining international capital flows is of course subject to the caveats noted above.

Simulating changes in foreign CIT rates

This report examines the effects of a gradual but significant decline in average statutory and marginal CIT rates around the world over an extended time period, coupled with the absence of changes in the CIT in the United States over the same time period. The analysis begins in 1988 when the CIT rate reductions enacted in the TRA86 were fully phased in, and then considers the CIT changes made abroad over roughly the next 30 years. The analysis accounts for several recently enacted foreign CIT rate reductions scheduled to occur by 2015, including those in the United Kingdom and in Japan. The tax structure after 2015 is assumed to remain in place permanently.

Modeling the effects of tax changes over nearly a thirty-year period is quite complex and involves various assumptions. This analysis proceeds in two steps. First, an initial equilibrium is established. The TPA Model is a standard dynamic general equilibrium model. In such a model, the economy must begin in a long-run equilibrium in which all components of the economy (e.g., output, capital stocks, labor supply, consumption) grow at a constant exogenously specified growth rate. To construct this initial equilibrium, 1988 data are used and the economy is assumed to be fully adjusted to the reforms enacted in the TRA86.[14] The model is further calibrated so that when the observed changes in foreign CITs are introduced, the model replicates the US economy in 2007.[15]

Second, the patterns of changes in STRs and METRs for the United States and the "rest-of-world" are imposed. This effectively yields tax law changes that can be simulated, with firms and consumers in the model responding to the changes in foreign tax structures. The macroeconomic effects of the lower CIT rates enacted abroad are estimated by comparing the results under these two scenarios – with and without the observed foreign CIT rate changes – within the context of the stylized representation of the US economy reflected in the TPA Model. The difference between these two scenarios provides an estimate of the cost to the United States of holding its CIT rate constant in the face of steady declines in both corporate STRs and corporate METRs abroad, under the assumption that everything else is held constant over the relevant time period.

Offsetting the decline in government revenue in the United States from capital outflows

In the TPA Model, any change in policy must leave the US federal government on a fiscally sustainable path; for example, an analysis of a reduction in CIT rates in the United States would require an offsetting fiscal policy change that would raise enough revenues to maintain fiscal balance. In the context of the policy changes analyzed by this report – a reduction in foreign CIT rates – an offsetting fiscal policy change is required because the resulting capital outflows and the associated lower level of GDP in the United States reduce US federal government revenues, and this revenue shortfall must be offset in some way.

While many financing assumptions could be made, this report simulates the effects for two alternative ways of offsetting the lost revenue associated with capital outflows and lower levels of GDP in the United States due to reductions in foreign CIT rates: 1) a reduction in government transfers,[16] and 2) an increase in wage taxes. In actuality, the lost revenue due to capital outflows from the United States was most likely, and can be expected to continue, to be offset by a combination of policy changes that would include both tax increases and spending reductions. Thus, the two financing assumptions used will largely bound possible results, although a prolonged period of deficit-financing or tax increases that included capital income taxes would likely have larger adverse effects.

Changes in the location of activities, income and deductions to take advantage of tax differentials will also play a role in the size of the policy needed to offset the effects of the capital outflow. A relatively high CIT rate has been found to reduce the size of a country's tax base, implying that a larger offsetting fiscal policy would be needed to maintain fiscal neutrality and offset a potentially larger estimated negative impact on US economic performance.[17] On the other hand, however, the ability to reduce CIT liability by changing the location of income and deductions can mitigate the negative effects of relatively high statutory tax rates, and thus reduce their negative effects on the location of real investment.

Extensions to the basic TPA Model

Although the basic TPA Model assumes that the United States is a closed economy characterized by perfect competition in all markets, this model is extended to reflect important elements of the current global economy. The TPA Model is extended to incorporate a foreign

sector and international flows of capital, intermediate goods[18], and international trade in consumption goods. Both firm-specific capital[19] that earns above-normal returns and "ordinary" capital that earns normal returns are included. The reallocation of firms' income and deductions are also modeled.[20]

With these modifications, the TPA Model includes both a single foreign "rest-of-world" sector and two types of multinational companies (MNCs): 1) a US-based MNC (US-MNC) consisting of a parent firm that invests in the United States and a foreign subsidiary that invests abroad, and 2) a foreign-based multinational (rest-of-world-MNC) that consists of a parent firm that invests in the rest-of-world and its subsidiary that invests in the United States.

To simplify the analysis, the rest-of-world is modeled as consisting entirely of the MNC sector (both US-MNC subsidiaries and rest-of-world-MNC parents). Thus, it is assumed that the remainder of the rest-of-world (i.e., foreign domestic-only firms) is unaffected by the CIT reforms analyzed. In addition, following Becker and Fuest (2005) and some other recent literature, two types of capital are included to account for differentially high international capital mobility of some forms of capital – in particular, to take into account firm-specific capital that earns economic rents and is relatively highly mobile across countries. Specifically, the model includes firm-specific capital that earns economic rents, is owned exclusively by the two MNCs, and is highly mobile across the United States and the rest-of-world, and a less internationally mobile capital that earns normal returns and is used by all firms. Both US and foreign-based MNCs also trade intermediate goods between their affiliates and can reallocate income and deductions between their affiliates, and the model includes trade between the United States and the rest-of-world in the consumer goods produced by the MNC sectors in each country.

V.   Simulation results

In this section, results are reported for several simulations of the macroeconomic effects of the reductions in foreign CIT rates documented above. Both short-run and long-run effects on GDP are presented, with foreign CIT rate reduction-induced changes in other macroeconomic variables presented as well. The report also provides estimates of the sensitivity of the results to the method of offsetting foreign CIT rate reduction-induced US revenue losses and to key assumptions regarding the responsiveness of international capital flows to differentials in tax rates.

Benchmark results

Table 1 shows the benchmark simulation results. The effects on the US economy of the steady decline in foreign CIT rates since the provisions of the TRA86 were fully implemented in 1988 are negative and significant. For example, when the offsetting fiscal policy is a reduction in government transfers, GDP decreases by 0.3% 10 years after 1988, by 1.2% after 25 years (i.e., 2013), and by 1.5% in the long-run (i.e., 2038 or 50 years after 1988).[21]

The reduction in GDP is primarily attributable to the shifting of capital abroad in response to the reductions in the rest-of-world CIT rates – from 45.4% to 29.6% for the GDP-weighted average statutory CIT rate and from 24.9% to 20.6% for the corporate METR – while US CIT rates remained roughly constant at their 1988 levels of a statutory tax rate of approximately 39% and a corporate METR of approximately 18% to 20%. For example, focusing on the results where a reduction in government transfers is the offsetting fiscal policy, the US-MNC reduces the amount of firm-specific capital allocated to the United States by 1.2% 10 years after 1988, and by 3.8% in the long run. These changes correspond to increases in the US-MNC foreign stocks of firm-specific capital of 2.7% 10 years after 1988 and 8.3% in the long run. The shifting of firm-specific capital by the rest-of-world-MNC reinforces these reallocations.

In addition, the stock of capital that earns normal returns decreases in the United States (as capital is shifted out of the United States and as investment declines) by 0.2% in 2013 (i.e., 25 years after 1988), and by 1.1% in the long run. These changes are accompanied by declines in consumption of 1.7% in 2013 (i.e., 25 years after 1988) and by 2.3% in the long run. Finally, although living standards, as measured by a decline in real wages, decrease due to the smaller US capital stock (by 1.0% in the long run), total labor market hours increase by 0.8% in 2013 (i.e., 25 years after 1988), and by 0.9% in the long-run.

The change in hours worked in the TPA Model is driven primarily by changes in disposable incomes and in the after-tax reward from work. When the reduction in government revenues is offset by a decrease in government transfers, disposable incomes fall, but the after-tax reward from work is unchanged. This has the effect of causing households to work more hours to, in effect, make up for the reduction in disposable incomes.

Table 1. Economic impact on the US economy of foreign reductions in corporate income tax rates under alternative financing assumptions, benchmark case

(% change in each variable)

Year (years since 1988)	Benchmark Case Reduction in government transfers				Benchmark Case Increase in wage taxes			
	1993 (5)	1999 (10)	2013 (25)	2038 (50)	1993 (5)	1999 (10)	2013 (25)	2038 (50)
GDP	-0.1	-0.3	-1.2	-1.5	-0.2	-0.5	-2.0	-2.6
US-MNC firm-specific capital in United States	-0.4	-1.2	-3.4	-3.8	-0.4	-1.3	-3.6	-4.2
RW-MNC firm-specific capital in United States	-2.2	-4.6	-9.4	-10.4	-2.2	-4.6	-9.8	-11.1
US-MNC firm-specific capital in rest-of-world	0.9	2.7	7.4	8.3	0.9	2.7	7.7	9.0
RW-MNC firm-specific capital in rest-of-world	0.5	1.1	2.4	2.6	0.5	1.2	2.4	2.8
Total "ordinary" US capital stock	0.0	0.1	-0.2	-1.1	0.0	0.1	-0.5	-2.4
US investment	0.9	1.1	0.4	-0.1	0.8	0.9	-0.7	-1.6
US consumption	-0.3	-0.6	-1.7	-2.3	-0.4	-0.7	-2.3	-3.3
US labor market hours	0.2	0.3	0.8	0.9	0.1	0.2	0.0	-0.1
US real wages	0.1	0.1	-0.3	-1.0	0.1	0.1	-0.1	-1.2

Note: Estimates reflect the percentage changes in each variable relative to the values that would occur in the absence of the reductions in CIT rates abroad.

The effects of the foreign CIT rate reductions are somewhat more negative when a wage tax increase is the offsetting fiscal policy, since higher wage taxes themselves have a negative effect on hours worked, which translates into less investment and GDP growth in the long run. For example, GDP declines by 2.6% (rather than 1.5%) in the long run, investment in ordinary capital falls by 2.4% (instead of 1.1%), and consumption falls by 3.3% (rather than 2.3%).

For the simulation in which the reduction in government revenues is offset by an increase in wage taxes, the change in total labor market hours is driven by both the lower disposable incomes and the reduction in the after-tax reward from work. These two changes have opposing effects on hours worked and, in this simulation, are roughly offsetting, leaving total hours worked in the labor market unchanged. Nevertheless, real wages fall under either fiscal policy offset, reflecting the decline in labor productivity due to the capital outflow from the United States in response to the lower CIT tax rates enacted abroad.

Sensitivity of results to alternative assumptions

This report also considers the robustness of the results in the context of changes in the values of some of the key parameters in the model, specifically those that determine the extent of international capital flows. For example, in Table 2, the effects of increasing the costs of adjusting both multinationals' stocks of firm-specific capital are examined; higher adjustment costs have the effect of reducing the reduction in firm-specific capital in the United States attributable to lower taxes abroad.

When the offsetting fiscal policy is a reduction in government transfers, the reduction in the declines in firm-specific capital in the United States are on the order of about one-third, and the decline in GDP is reduced by about 15%, from a decline of 1.5% to 1.3% in the long run. When the offsetting fiscal policy is an increase in wage taxes, the reductions in the declines in firm-specific capital in the United States are also roughly about one-third, but the declines in total labor market hours worked and in investment in capital that earns normal returns are nearly unchanged, so that the decline in GDP falls by only 10% from 2.6% to 2.4% in the long-run.

In Table 3, the effects of increasing the assumed responsiveness of the supply of ordinary capital to taxes are examined under the two alternative financing assumptions. These effects are fairly modest. In the benchmark case shown in Table 1, the stock of capital that earns normal returns declines by 1.1% (government transfer offset) or 2.4% (wage tax offset) in the long run. With the higher capital elasticity, as shown in Table 3, the stock of capital that earns normal returns falls by 1.6% (government transfer offset) or by 2.7% (wage tax offset). However, the declines in firm-specific capital are somewhat smaller under either financing assumption, resulting in no net change (government transfer offset) or only a modest change (wage tax offset) in the decline in GDP.

Table 2. Economic impact on the US economy of foreign reductions in corporate income tax rates under alternative financing assumptions, higher adjustment costs

<u>**(% change in each variable)**</u>

	Higher firm-specific capital adjustment costs				Higher firm-specific capital adjustment costs			
	Reduction in government transfers				Increase in wage taxes			
Year (years since 1988)	1993 (5)	1999 (10)	2013 (25)	2038 (50)	1993 (5)	1999 (10)	2013 (25)	2038 (50)
GDP	-0.1	-0.3	-1.0	-1.3	-0.2	-0.4	-1.8	-2.4
US-MNC firm-specific capital in United States	-0.3	-0.9	-2.4	-2.6	-0.3	-0.9	-2.4	-2.8
RW-MNC firm-specific capital in United States	-1.3	-2.9	-6.2	-6.8	-1.3	-2.9	-6.4	-7.3
US-MNC firm-specific capital in rest-of-world	0.7	1.9	5.1	5.8	0.7	2.0	5.4	6.2
RW-MNC firm-specific capital in rest-of-world	0.3	0.7	1.5	1.7	0.3	0.7	1.6	1.8
Total "ordinary" US capital stock	0.0	0.1	-0.1	-1.1	0.0	0.1	-0.5	-2.3
US investment	0.9	1.1	0.4	-0.1	0.8	0.9	-0.7	-1.6
US consumption	-0.3	-0.5	-1.6	-2.1	-0.3	-0.6	-2.1	-3.1
US labor market hours	0.2	0.3	0.8	0.9	0.1	0.2	0.0	-0.2
US real wages	0.1	0.1	-0.2	-0.9	0.1	0.2	0.0	-1.0

Note: Estimates reflect the percentage changes in each variable relative to the values that would occur in the absence of the reductions in CIT rates abroad.

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Table 3. Economic impact on the US economy of foreign reductions in corporate income tax rates under higher capital supply elasticity under alternative financing assumptions

(% change in each variable)

Year (years since 1988)	Higher capital supply elasticity (1.0) Reduction in government transfers				Higher capital supply elasticity (1.0) Increase in wage taxes			
	1993 (5)	1999 (10)	2013 (25)	2038 (50)	1993 (5)	1999 (10)	2013 (25)	2038 (50)
GDP	-0.1	-0.3	-1.3	-1.5	-0.2	-0.5	-2.0	-2.7
US-MNC firm-specific capital in United States	-0.3	-1.1	-3.1	-3.5	-0.3	-1.1	-3.2	-3.9
RW-MNC firm-specific capital in United States	-1.9	-4.2	-8.7	-9.7	-1.9	-4.3	-9.1	-10.5
US-MNC firm-specific capital in rest-of-world	0.6	2.4	6.7	7.6	0.6	2.4	7.0	8.4
RW-MNC firm-specific capital in rest-of-world	0.5	1.1	2.2	2.4	0.5	1.1	2.3	2.6
Total "ordinary" US capital stock	-0.1	0.0	-0.6	-1.6	-0.2	-0.1	-0.9	-2.7
US investment	1.0	1.2	0.4	-0.1	0.9	1.0	-0.7	-1.7
US consumption	-0.4	-0.6	-1.8	-2.4	-0.4	-0.7	-2.3	-3.4
US labor market hours	0.2	0.3	0.8	0.9	0.2	0.2	0.0	-0.1
US real wages	0.1	0.1	-0.3	-1.1	0.1	0.1	-0.1	-1.2

Note: Estimates reflect the percentage changes in each variable relative to the values that would occur in the absence of the reductions in CIT rates abroad. The capital supply elasticity was 0.5 for the benchmark case (i.e., Table 1).

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Limitations of the analysis

While the impacts estimated by this report are suggestive of the adverse effects of lower CIT rates enacted abroad on US economic performance, there are many limitations of the analysis that should be noted. There are of course various standard concerns about any computable general equilibrium modeling analysis, including the validity of the structural assumptions of the model, the choices of functional forms and parameter values, the compromises that must be made in imposing steady-state equilibrium conditions on the model, and the difficulties of modeling complex tax systems in model-equivalent forms.[22]

The application of the model in this analysis is especially difficult, as the tax law changes being analyzed represent gradual changes in foreign CIT rates over an extended time period, imposed initially in a steady-state equilibrium that occurred nearly 30 years ago (rather than the more easily modeled case of a one-time reform enacted in the current equilibrium).[23] Moreover, as noted above, the results should be interpreted as simply reflecting the estimated effects on the US economy of imposing the reductions in foreign CIT rates within the context of the model, holding all else constant – that is, ignoring all of the other factors that might have affected investment in the United States and the world economies over the intervening period as well as the other features of the US and foreign tax systems that are not modeled explicitly.

Also, while the analysis reflects some of the base broadening included in other countries' reforms, principally reductions in the tax benefits provided through generous depreciation allowances, the report does not take into account the potential effects of other base-broadening changes or in the taxation of foreign-source income. For example, other countries have made other changes to their tax systems, such as shifting towards greater reliance on VATs and generally moving towards territorial tax systems during the period analyzed by this report.

Nevertheless, the model reflects a rich if necessarily incomplete representation of the US economy and tax system that is consistent with, and to some extent improves on, many other similar models that have appeared in the economic literature. Accordingly, the estimated effects obtained from the various simulations described in this report are suggestive of the costs to the US economy imposed by holding US CIT rates constant in the face of steady declines in CIT rates around the world.

VI.   Summary

Over the past several decades, most developed countries have steadily reduced their CIT rates, while the US CIT rate has remained largely unchanged. These reductions were largely prompted by the forces of globalization and increasing international tax competition, as countries pursued highly mobile capital investments made by large multinational corporations. A comparison of METRs shows a similar trend, dampened somewhat by the base broadening that has often accompanied CIT rate reduction in many other countries.

After the sharp reduction in the CIT rate enacted in the TRA86 (from 48% to 34%), the US statutory CIT rate has remained largely unchanged, with the exception of a small increase to 35% in 1993, despite the significant rate reductions that have been enacted abroad. These trends in CIT rates in the United States and abroad have left the United States with the highest statutory rate among the major economies, and without a relative advantage in marginal effective tax rates. These high US CIT rates have raised concerns about whether the US CIT makes it more difficult for US multinationals to compete in the global economy, especially since empirical research has generally found that FDI is sensitive to differentials in tax rates across countries, and that this sensitivity may be increasing over time.

This report examines the macroeconomic effects on the US economy of the rate reductions enacted abroad since 1988 using the Tax Policy Advisers model, a dynamic macroeconomic model of the US economy. The reduction in CIT rates abroad, even when taking into account the associated base broadening, is found to have significant adverse effects on the US economy. This report considers the trends in CIT rates not only on marginal investment decisions, but also through other avenues such as the location of investment, income, and deductions.

In the benchmark simulations, GDP is estimated to be lower by between 1.2% and 2.0% by 2013 than it would be otherwise, depending on the how the associated reduction in government revenues is financed. The effects on GDP are larger in the long run, with an estimated 1.5% to 2.6% reduction in GDP or a reduction in GDP of roughly between $235 billion and $345 billion in today's $15.7 trillion economy, depending on the offsetting change in fiscal policy. Living standards, as measured by changes in workers' real wages, are also lower than they would be otherwise, falling in the long run by between 1.0% and 1.2%, again depending on which offsetting change in fiscal policy is simulated.

The estimates presented in this report suggest that the high CIT rate in the United States is beginning to have significant adverse economic consequences. These results suggest that reform of the US tax system that includes a reduction in the CIT rate is likely to have a significant positive effect on US economic performance.

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[1] For a description of the Administration's Framework for Business Tax Reform, see: http://www.treasury.gov/resource-center/tax-policy/Documents/The-Presidents-Framework-for-Business-Tax-Reform-02-22-2012.pdf.

[2] The long-run estimates are for 2038. Models of this type typically find that about two-thirds to three-quarters of the long-run changes in output are attained within 10 years.

[3] These data on CIT rates draw on and update a comprehensive data set on CIT rates in 19 OECD countries maintained by the Institute for Fiscal Studies (IFS); see the time series of tax rates provided in "Corporate Tax Rate Data," prepared by Alexander Klemm, available at http://www.ifs.org.uk/publications/3210. These data were updated and projected to 2015 based on information available on recent tax changes that have been enacted but not yet fully implemented.

[4] International Monetary Fund, *World Economic Outlook Database*, April 2012.
http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/weoselco.aspx?g=2001&sg=All+countries.

[5] For example, see US Department of the Treasury (2007) and Bull, Dowd and Moomau (2011).

[6] The METR is a measure of the additional economic profit needed for a barely profitable hypothetical investment to cover taxes over its life. It is calculated as the difference between the before- and after-tax return for such an investment divided by its pre-tax return. The METR calculations for both the US and the rest-of-the-world do not include tax incentives that are not generally applicable, such as R&D tax incentives or the US domestic production deduction, and do not consider individual level taxation. In addition, the calculations assume that the taxes due on the hypothetical investment are paid; that is, the analysis does not consider tax evasion or tax avoidance (other than the shifting of income and deductions between the United States and the 18 other OECD countries analyzed), such as the shifting of income to very low-tax rate countries.

[7] A third measure used by the IFS is the average effective tax rate (AETR), calculated as a weighted average of the statutory and marginal effective tax rates using the approach developed by Devereux and Griffith (2003), where the weights in the AETR calculations depend on the ratio of above-normal returns to normal returns; however, this report did not have all of the data needed to update the IFS AETR calculations. Given that recent estimates of the ratio of above-normal to normal returns is fairly high (approximately 2.6, according to a recent US Treasury report (Cronin, Lim, Power and Cooper, 2012)), AETRs are roughly approximated by STRs. (As the level of above-normal returns increases, the AETR approaches the STR.)

[8] As noted above, the METRs calculated for this report are based on IFS data computed by Klemm for 1982 through 2005. These estimates are then extended using the trend for METRs calculated based on statutory CIT rates and depreciation allowances from Oxford University's Centre for Business Taxation. Separate METRs are constructed for investment in equipment, structures, land and inventories with constant weights across asset types and sources of finance so that differences in estimated METRs across countries only reflect differences in their tax systems.

[9] Some countries have also increased their VAT rates or increased investor-level taxes on dividends and capital gains. Because the VAT, a form of consumption tax, generally does not impose tax on the return to just profitable marginal investments, they have no effect on the METR. Higher foreign individual level taxes on dividends and capital gains, which are not incorporated in this report, would dampen the decline in METRs and the estimated macroeconomic effects somewhat, while the corporate-individual integration schemes used in some of the OECD countries analyzed would have the opposite effect. For a discussion of recent changes in dividends and capital gains tax rates, see Carroll and Prante (2012).

[10] For example, see Devereux and Lockwood (2006).

[11] US Department of Commerce, "Foreign Direct Investment in the United States," *Economics and Statistics Administration Issue Brief #02-11*, June 2011.

[12] See de Mooij and Ederveen (2003, 2005). Specific examples of studies include Altshuler and Grubert (2004) and Altshuler, Grubert and Newlon (2001).

[13] Economic rent refers to investment returns over and above the returns an individual or firm could normally expect to receive in a competitive marketplace. Such rents might, for example, result from technological innovation, market power, unique managerial skills or production processes, or risk-taking and would generally accrue to the investors or owners of a firm.

[14] Note that this assumption implies that the negative effects on the US economy of the subsequent cuts in foreign CIT rates will be understated to some extent, since these effects will be dampened temporarily as the US economy adjusts to the tax cuts enacted in the Tax Reform Act of 1986.

[15] Note that 2007 is used as the benchmark year because it is more likely to approximate a long-run equilibrium than the more recent "great recession" years, which have been characterized by relatively low levels of investment, especially in housing, and relatively high government deficits.

[16] A government transfer program is a program that primarily transfers or reallocates resources from one group to another. From an economic perspective, such a program affects household income but not the after-tax reward to work or saving.

[17] For example, see Grubert (1998, 2001, 2003, 2012), Clausing (2003, 2009) and Bartelsman and Beetsma (2003).

[18] An intermediate good is a good that is used to produce a final good.

[19] Firm-specific capital is capital that is unique to a firm. It could include, for example, a firm-specific technology, brand or innovation.

[20] The reallocation of income and deductions in response to the high US CIT rate may dampen the disincentive effects of the relatively high CIT rates in the United States. Such reallocation is explicitly taken into account in the model used for this report. See, for example, Diamond, Zodrow, Neubig and Carroll (2011).

[21] In the context of the TPA Model, the long run refers to the point in time when the economy is very nearly fully adjusted to the reductions in CIT rates abroad and resumes growing at a constant rate. For the policy change modeled in this report, this occurs within 50 years of the initial change in rates (i.e., 2038). It is important to note that foreign tax rates

continue to change between 1988 through 2015 and the long run can, in effect, be viewed here relative to the first year in which changes in foreign tax rates are considered (i.e., 1988).

[22] For example, some structural elements of the model that might be viewed as problematical include the assumptions of far-sighted profit-maximizing firms and far-sighted utility-maximizing consumers, and the specific modeling of perfect and imperfect competition in the various product and factor markets.

[23] During this time period there was also an increase in the share of business income that is taxed only once in the United States through the use of the pass-through business form. The TPA model does include a noncorporate sector and takes into account the effects of changes in the relative taxation of investment in the corporate and noncorporate sectors.