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Business Tax Burdens and Tax Reform

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ABSTRACT

Tax reforms affect economic performance by changing incentives for business formation, expansion, and operation. The United States has the highest corporate tax rate among OECD countries in 2017, and despite offering significant additional deductions, exclusions, and tax credits, imposes the heaviest tax burdens. This paper offers a new measure of corporate tax burdens based on information in tax expenditure budgets; this measure implies that the burden of U.S. corporate taxation in 2017 is equivalent to that produced by a corporate tax rate between 31.2-34.6% without additional deductions, exclusions, or tax credits. Efficient design of a business tax system encourages activities with beneficial economic spillovers and imposes lighter burdens on industries and activities that are most responsive to taxation. Tax reforms have the potential to improve economic efficiency by adjusting the level and design of U.S. business taxes.

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1. Introduction

Business taxes in the United States and elsewhere raise revenue at the cost of discouraging business activity, a tension that lies inescapably at the heart of any business tax policy. A near-universal characteristic of governments is that they desire strong economies, for which they rely on businesses as drivers. Governments also need to finance their expenditures. It is possible to improve a country's economic outcomes without sacrificing business tax revenues by restructuring its business taxes in a revenue-neutral way that improves efficiency by better aligning production incentives with economic costs and returns, and that directs tax burdens to where they have the least harmful effects on aggregate economic activity. There is, however, a natural limit to the effectiveness of any such a reform strategy, since business taxes by their very nature depress incentives for business formation and expansion.

An alternative and possibly supplementary method of encouraging business activity would be to reduce business taxes and replace the lost revenue with other taxes. But quite apart from the unattractiveness of any replacement taxes such a course would run into another common constraint on democratic policy-making, which is the political importance of appearing to impose significant tax burdens on businesses. Of course the notion of actually imposing a tax burden on business is illusory, since the burdens of business taxes are borne by combinations of individuals – business owners, domestic workers and consumers, possibly foreigners or others – rather than by business entities per se. And as a method of raising tax revenue many business taxes are considerably less efficient and equitable than are other tax alternatives that are within the power of governments to enact. But some combination of the difficulty of legislative compromise, prevailing uncertainty over who actually bears the burden of business taxes, and the powerful if misleading imagery of taxing large affluent business organizations creates political imperatives sufficiently compelling that heavy and distortionary business entity taxation persists in some countries, notably including the United States, despite the economic consequences of these taxes.

Much of the international experience differs from that of the United States. In recent decades most high-income countries other than the United States have significantly lowered their corporate tax rates, and many have dramatically reduced or eliminated their taxation of foreign

business income, introduced special tax regimes for income produced by intellectual property, and generally sought to reduce business tax burdens. These efforts are intended to stimulate local economies by encouraging business formation and expansion, and to put countries in strong positions to compete for internationally-mobile business activity and income. It is noteworthy that these business tax reductions have been enacted by foreign governments of all political persuasions. The United States continues to tax worldwide business income, has not reduced its statutory corporate tax rate since 1986, and since 1986 has significantly increased the personal income tax rates at which unincorporated businesses and subchapter S corporations are taxed. While the United States has in the meantime introduced some business tax incentives, including rapid write-offs of new business investment, the relatively minor economic significance of these incentives compared to significant foreign tax reductions has made the United States a comparatively much less attractive tax environment for business activity.

There is widespread and to some degree bipartisan concern that the 2017 business tax environment adversely affects the U.S. economy by making the United States a relatively unattractive location for internationally mobile business headquarters and investment, and by imposing distortionary and excessively heavy burdens on the businesses that remain located in the United States. Of course there is far from a consensus on the nature and features of beneficial reforms that the country might adopt. Proposed reforms can be evaluated on two dimensions, their effects on total business tax burdens, and their effects on the efficiency of resource allocation at any given level of aggregate business tax burden. It is noteworthy that proposed reforms also generally fall into two categories: those that would reduce total business tax burdens, and those that would restructure business taxes without much changing aggregate burdens, typically by reducing statutory tax rates while expanding business tax bases. Many proposed reforms of both types would have the United States adopt a territorial tax system that largely or entirely exempts foreign business income from U.S. taxation.

Business tax reductions are logical reactions to heavy aggregate U.S. tax burdens, though as a design feature or perhaps a concession to political concerns the reductions in entity-level business tax burdens can be buried in proposal details. The 2016 U.S. House of Representatives Republican tax reform plan for a destination-based corporate cash-flow tax effectively introduces a significantly modified VAT-style tax and uses the revenues that this tax generates to finance

reduced corporate tax rates and a narrowing of the corporate tax base. Separate corporate tax integration proposals would increase U.S. shareholder taxes on dividends (and possibly capital gains) while reducing U.S. business entity-level taxes by (for example) permitting deductions for dividends paid to shareholders. These tax integration proposals redirect a portion of the burden of equity-financed investment from firms to dividend recipients, in the process reducing entity-level business taxes.

An alternative reform strategy is to maintain tax collections from business entities at roughly their current levels, but to reduce statutory business tax rates while expanding business tax bases. Examples include President Obama's proposed budgets that would have reduced the statutory U.S. corporate tax rate, implemented a form of territorial taxation, and limited certain business deductions. The primary goal of such proposed reforms is to address adverse incentives caused by high statutory tax rates. Of course statutory tax rate reductions that are financed with tax base expansions cannot improve incentives for all business activities, since incentives are products of marginal tax rates, and it is impossible to reduce all marginal business tax rates while keeping average business tax rates unchanged. Consequently, if business tax reform is to be revenue-neutral within the business sector, then it will encourage some business activities and discourage others. It is certainly possible to improve the efficiency of business taxes this way, but there is a strict limit to the extent to which it is thereby possible to reduce total business tax burdens and consequently improve incentives for business activity as a whole.

The second section of this paper considers the burden of U.S. business taxes, introducing a new measure of corporate tax burdens that offers additional evidence of the extent to which U.S. corporate taxes exceed those of other high-income countries. The third section considers efficient business tax design, with implications for proposed tax reforms.

2. *U.S. Business Tax Burdens*

Available measures commonly suggest that U.S. businesses in 2017 face tax burdens that exceed those of almost all – and possibly all – other countries. One challenge in ranking the relative tax burdens of different countries is that no single measure offers an entirely reliable or

compelling metric by which to compare tax systems. The most easily accessible comparative guide is provided by statutory corporate tax rates. Since countries differ in the extent to which subnational governments levy business taxes, it is important to incorporate subnational taxes when comparing them. The OECD (2017) reports combined national and average subnational corporate tax rates for the 35 OECD member countries; Table 1 displays these 2017 tax rates from highest to lowest. The United States appears prominently at the top of the list, with an average 38.91% tax rate; France is a distant second, at 34.43%, Belgium third at 33.99%, Germany fourth at 30.18%, and the 31 remaining OECD countries have tax rates of 30% or below, notably including Canada (26.7%) and the United Kingdom (19%).

By the measure of statutory corporate tax rates the United States clearly has the highest business tax burden among OECD countries in 2017, but there is understandable concern that statutory tax rates fail to capture important aspects of tax systems, and as a result have the potential to offer misleading guides to comparative tax burdens. Business tax systems differ in the degrees to which they feature favorable deductions, tax credits, exclusions, and other provisions designed to encourage specific business activities. These tax provisions serve to mitigate tax burdens, thereby subjecting businesses to effective tax burdens that can be significantly lower than those suggested by headline tax rates. Furthermore, savvy taxpayers commonly structure their firms and their business transactions in ways that are designed to benefit from available tax deductions and tax credits.

2.1. Estimating burden-equivalent tax rates

It is possible to use estimates of the value of favorable tax provisions to modify statutory corporate tax rates to construct burden-equivalent corporate tax rates – tax rates that reflect the tax burdens imposed on corporations net of any favorable tax deductions, income exclusions, and tax credits. Because these burden-equivalent tax rates incorporate the values of special tax provisions, they can be used to assess relative corporate tax burdens. Many governments publish what are known as tax expenditure budgets, which consist of estimates of tax revenue foregone by legislated deviations from what would otherwise have been standard taxation. In 2017 by far the largest U.S. corporate tax expenditure is that associated with deferral of U.S. taxation of unrepatriated foreign income (\$123.2 billion), with accelerated depreciation of equipment

investment (\$28.6 billion), the favorable treatment of R&D expenditures (\$16.5 billion), the domestic production activities deduction (\$12.1 billion), and the low-income housing tax credit (\$8.2 billion) the next largest individual items.

Tax expenditure budgets were introduced by the United States (Surrey, 1973), and many of their applications are highly controversial, since the magnitudes of estimated tax expenditures depend critically on what one takes to be a standard tax system. Thus, for example, the tax expenditure associated with deferral of U.S. taxation of foreign income presumes that in a standard tax system the United States would tax the foreign incomes of its resident companies, which is a highly controversial position given that most high-income countries do not do so. Similarly, the tax expenditure amount for accelerated tax depreciation of capital investment depends on the counterfactual, the tax depreciation provisions that would constitute a normal tax system, about which there is considerable disagreement. Despite these and other concerns with tax expenditure budgets, they provide information that can be readily used to modify statutory tax rates, particularly as governments conveniently distinguish corporate tax expenditures from non-corporate tax expenditures.

In constructing burden-equivalent corporate tax rates it is important to distinguish two forms of corporate tax expenditures: those that restrict the tax base (examples include unusually generous tax deductions and partial exclusions for certain categories of income) and those (such as tax credits) that do not. Consider the case in which a representative firm is subject to tax at rate τ , has gross income of y and three categories of expense, x_1 , x_2 and x_3 . All expenses are fully deductible from taxable income, and in addition the firm is permitted an extra tax deduction equal to a fraction α of expense of type 3. In addition, the firm can claim a tax credit for a fraction k of its expenditures on x_2 . The firm's after-tax profits (π) are:

$$(1) \quad \pi = (1 - \tau)[y - x_1 - x_2 - x_3] + \tau\alpha x_3 + kx_2.$$

Total tax revenue is $\left\{ \tau [y - x_1 - x_2 - (1 + \alpha)x_3] - kx_2 \right\}$, and total tax expenditures are $[\tau\alpha x_3 + kx_2]$.

Differentiating the determinants of π with respect to the tax parameters τ , α , and k , and applying Shephard's lemma, it follows that

$$(2a) \quad \frac{\partial \pi}{\partial \tau} = -[y - x_1 - x_2 - (1 + \alpha)x_3]$$

$$(2b) \quad \frac{\partial \pi}{\partial \alpha} = \tau x_3$$

$$(2c) \quad \frac{\partial \pi}{\partial k} = x_2.$$

The goal in measuring a burden equivalent tax rate $\hat{\tau}$ is to determine the value of τ that, if applied to pretax profits without an extra deduction for x_3 or a tax credit for x_2 , would produce a tax burden equivalent to the existing tax system. One can think of first removing the extra tax deduction α while simultaneously reducing the corporate tax rate to keep the firm's total tax burden unchanged, thereby producing an intermediate value τ^* to accompany $\alpha = 0$. Denoting by $\frac{d\hat{\tau}^c}{d\alpha}$ the change in τ needed to accompany a small change in α in while keeping firm profits constant, it follows from (2a) and (2b) that

$$(3) \quad \frac{d\tau^c}{d\alpha} = \frac{\tau x_3}{[y - x_1 - x_2 - (1 + \alpha)x_3]}.$$

Analogously, (2a) and (2c) together imply that for a corresponding change in tax credits and tax rates,

$$(4) \quad \frac{d\tau^c}{dk} = \frac{x_2}{[y - x_1 - x_2 - (1 + \alpha)x_3]}.$$

A first-order approximation to the effect of removing α on the value of τ^* is $\alpha \frac{d\hat{\tau}^c}{d\alpha}$, but one of the challenges of using (3) to estimate τ^* this way is that the magnitude of the derivative on the right side of (3) changes as α declines. A convenient approximation is to apply this formula using the average of the values of $\frac{d\hat{\tau}^c}{d\alpha}$ taken before and after the removal of α . Using this approximation, it follows that

$$(5) \quad \tau^* \approx \tau - \alpha \left\{ \frac{\tau x_3}{2[y - x_1 - x_2 - (1 + \alpha)x_3]} + \frac{\tau^* x_3^*}{2[y^* - x_1^* - x_2^* - x_3^*]} \right\},$$

in which y^* , x_1^* , x_2^* , and x_3^* are values of these income and expense items when $\alpha = 0$ and the tax rate is τ^* . Equation (5) implies

$$(6) \quad \tau^* \approx \tau \frac{\left\{ 1 - \frac{\alpha x_3}{2[y - x_1 - x_2 - (1 + \alpha)x_3]} \right\}}{\left\{ 1 + \frac{\alpha x_3^*}{2[y^* - x_1^* - x_2^* - x_3^*]} \right\}}.$$

It is possible to estimate bounds of the value of τ^* by applying assumptions about the determinants of the ratio that appears in the denominator of the right side of (6). If economic behavior is unaffected by tax expenditures – the assumption that generally underlies government calculation of tax expenditure amounts – then the values of gross income and expenses in the denominator of the right side of (6) are the same as those in the numerator. This assumption is very unlikely to be true, since increasing the after-tax cost of x_3 while keeping total business tax burdens unchanged is likely to reduce the intensity with which a representative firm uses x_3 ; but the no responsiveness assumption provides one bound on the value of τ^* . The opposite extreme assumption – and it is quite extreme – is that in the absence of the additional tax deduction firms would not use input x_3 , so that $x_3^* = 0$ and the denominator of the right side of (6) is unity. More realistically one should expect an accurate value of τ^* to lie between those implied by these assumptions.

With τ^* available from (6), $\hat{\tau}$ can be determined by using (4) to adjust the tax rate for removal of the tax credit, which using a method analogous to (5) implies that

$$(7) \quad \hat{\tau} \approx \tau^* - k \left\{ \frac{x_2^*}{2[y^* - x_1^* - x_2^* - x_3^*]} + \frac{x_2^{**}}{2[y^{**} - x_1^{**} - x_2^{**} - x_3^{**}]} \right\},$$

in which y^{**} , x_1^{**} , x_2^{**} , and x_3^{**} are values of these income and expense items when $k = 0$ and the tax rate is $\hat{\tau}$. In the extreme case in which behavior is assumed to be unaffected by tax preferences, then the values of gross income and expense on the right side of (7) are those prevailing under the current tax system. In the opposite extreme case, in which x_3^* is assumed to be zero, it is also necessary to assume that x_2^{**} is zero, that removal of the tax credit eliminates the use of x_2 . The only undetermined expression in (7) is the ratio $\left[x_2^* / (y^* - x_1^* - x_2^* - x_3^*) \right]$, which depends on the nature of the production function: this ratio is larger if x_2 and x_3 are substitutes in production (holding constant total business tax burdens, and therefore roughly holding output constant), and smaller if they are complements. Acknowledging that all productive inputs have at least some conditional substitutes, for the purpose of calculating an upper bound it is reasonable to take this ratio not to change as x_3 declines, again making the values of gross income and expense on the right side of (7) the same as those prevailing under the current tax system.

2.2. Estimated U.S. corporate tax burdens

An extremely convenient feature of the system described by (6) and (7) is that the lower and upper bounds on $\hat{\tau}$ can be readily calculated using publicly reported data on corporate tax expenditures and corporate tax revenues. Under the assumption that taxpayer behavior is unaffected by tax preferences, (6) and (7) together imply that the lower bound on $\hat{\tau}$, denoted $\hat{\tau}_1$, can be calculated as:

$$(8) \quad \hat{\tau}_1 = \tau \left\{ \frac{1 - \frac{(TE - TC)}{2(TR + TC)}}{1 + \frac{(TE - TC)}{2(TR + TE)}} - \frac{TC}{(TR + TE)} \right\},$$

in which $TE \equiv [\tau\alpha x_3 + kx_2]$ is the aggregate value of corporate tax expenditures, $TC \equiv kx_2$ is the tax credit component of tax expenditures, and $TR \equiv \left\{ \tau [y - x_1 - x_2 - (1 + \alpha)x_3] - kx_2 \right\}$ is total corporate tax revenue. Similarly, the upper bound on $\hat{\tau}$, denoted $\hat{\tau}_2$, can be calculated as:

$$(9) \quad \hat{\tau}_2 = \tau \left\{ 1 - \frac{(TE - TC)}{2(TR + TC)} - \frac{TC}{2(TR + TE)} \right\}.$$

In order to calculate $\hat{\tau}_1$ and $\hat{\tau}_2$ from (8) and (9) it is necessary to use estimates of total corporate tax expenditures and the portion corresponding to tax credits.¹ The United States Treasury reports corporate tax expenditures by category of tax provision, cautioning that its tax expenditure figures are calculated one provision at a time and under the assumption that economic behavior does not respond to incentives created by tax expenditures. Since tax expenditures can have interacting effects on tax revenue, the total revenue effects of tax expenditures need not equal the sum of individual items. It is nonetheless informative to sum reported corporate tax expenditures to obtain an estimate of their total, though in so doing it is appropriate to exclude two categories of reported corporate tax expenditures. The first is deferral of U.S. taxation of the unrepatriated foreign profits of U.S. firms. This item, which is by far the largest reported corporate tax expenditure, reflects taxes not collected because the United States while imposing a worldwide tax system does not do so on an accrual basis, instead taxing most foreign income only when repatriated. Most countries, including all other G-7 countries and all but a few other OECD countries, either exempt from tax the foreign incomes earned by their resident companies or else tax only trivial portions of this income. These countries do not consider the failure to tax the foreign incomes of their resident companies to be tax expenditures, so in order to make a U.S. burden-equivalent tax rate internationally comparable is inappropriate to treat deferral of foreign income as a tax expenditure. The second modification is to exclude the tax expenditure for tax-exempt state and local debt held by corporations,² as it is well understood that the bond market prices this debt in a way that the vast majority of the tax benefit flows to issuing states and localities in the form of lower borrowing costs, whereas holders of this debt receive reduced pretax returns and therefore only very small net benefits.

¹ Intuitively, the reason why tax credits have somewhat different effects on burden-equivalent tax rates than do other tax expenditures is that tax credits do not restrict the base to which statutory tax rates apply. Tax provisions that restrict the tax base mitigate the effects of statutory tax rates, since a 35 percent tax rate that applies to 90 percent of income is equivalent to a 31.5 percent tax rate on 100 percent of income. Consequently, removing \$1 of tax expenditure corresponds to a greater reduction in the burden-equivalent tax rate the higher is the ratio of deduction-based to total tax expenditures.

² The tax expenditure for the exclusion of interest on state and local debt held by corporations was \$8.4 billion in 2017, a small portion of aggregate corporate tax expenditures that year. Including this tax expenditure in full would reduce $\hat{\tau}_1$ from 31.2% to 30.6%, and reduce $\hat{\tau}_2$ from 34.6% to 34.2%.

Table 2 presents estimates of $\hat{\tau}_1$ and $\hat{\tau}_2$ for the United States for fiscal years 2005-2017 inclusive, along with underlying data on contemporaneous values of TE , TC , TR , and the U.S. combined federal and state statutory tax rate.³ Two facts are evident from the table: the burden-equivalent tax rates $\hat{\tau}_1$ and $\hat{\tau}_2$ are significantly lower than the contemporaneous statutory corporate tax rates, and the burden-equivalent tax rates are nonetheless quite high. For fiscal year 2017, $\hat{\tau}_1 = 31.2\%$ and $\hat{\tau}_2 = 34.6\%$, which suggests that the true burden-equivalent tax rate lies between these figures, likely closer to 31.2% than to 34.6%. If no other OECD country had any corporate tax expenditures at all even a burden-equivalent tax rate of 31.2% would make the United States corporate tax system the third most burdensome of all OECD countries. But of course other OECD countries also offer their firms tax breaks of many types including research credits, accelerated depreciation of capital investment, favorable taxation of certain categories of business income, and other provisions that in the United States would be classified as corporate tax expenditures. National differences in tax expenditure reporting concepts and practices (OECD, 2010; Astarita et al., 2014) make it extremely difficult to offer consistent calculations of foreign burden-equivalent tax rates to be used for international comparisons, but it is nonetheless clear that the United States has a very high rate relative to other high-income countries.

Tax expenditure and corporate tax revenue data exhibit fluctuations between years and over business cycles that reflect annual accounting year concepts, transitory fluctuations, and other features that make these annual figures noisy measures of the long-run incentives created by corporate tax systems. For this reason it is useful to consider the 2005-2017 series of estimated burden-equivalent tax rates, the lower bound of which exceeds 29% every year except for three of the four years following the crash of 2008 (when significant business tax incentives were introduced), and the upper bound of which is exceeds 32% in all but two years. U.S. burden-equivalent corporate tax rates are consistently high because combined U.S. federal and state statutory tax rates are very high, and U.S. corporate tax expenditures, while certainly significant, are not large enough in magnitude to reduce U.S. tax burdens to the point that they would become comparable to the significantly lower corporate tax burdens of other countries.

³ The calculations in Table 2 implicitly treat average state corporate income tax systems as offering tax expenditures that are equivalent to federal tax expenditures; to the extent that this assumption overstates the value of state tax expenditures, this treatment produces estimated burden-equivalent tax rates that are slightly too low.

U.S. corporate tax burdens are high despite efforts by U.S. corporations to avoid tax obligations in various ways, including investing in tax-preferred activities such as R&D, domestic manufacturing, and low-income housing, financing investments with debt rather than equity in order to obtain tax deductions for interest expenses, and locating profitable investments in low-tax locations, including foreign locations. Corporate tax avoidance is costly, as evidenced by the incompleteness of tax avoidance in practice and the empirical pattern that avoidance activity increases significantly as tax burdens grow.⁴ The costs of activities that facilitate tax avoidance – such as borrowing more than firms would otherwise want to do, committing capital to low-return investments abroad or in domestic R&D, manufacturing, or low-income housing projects, or engaging in other tax-preferred activities – are part of the burden of taxation; and these costs account for the differences between $\hat{\tau}_1$ and $\hat{\tau}_2$ in Table 2. And the United States is not unique in this regard: corporations in other countries also avoid taxes, and incur costs in doing so. U.S. corporations that are subject to significantly higher burden-equivalent corporate tax rates than are corporations resident in other OECD countries can therefore be expected to avoid taxes aggressively but nonetheless face the highest tax burdens.

2.3. Other evidence and implications of U.S. business tax burdens

The high estimated burden-equivalent tax rates facing U.S. corporations are consistent with other measures of their relative tax burdens. The financial accounts of corporations located in different countries can be used to produce measures of effective corporate tax rates, generally defined as average ratios of tax obligations to pretax incomes. Markle and Shackelford (2012) consider financial statement information for publicly held multinational corporations located in 82 different countries from 1988-2009, estimating the determinants of firms' worldwide average tax rates. After controlling for industry, year, and firm size, they find that national domicile is significantly associated with average tax rates reported in financial accounts, with Japanese multinational firms facing the highest average tax rates, and U.S. firms facing the second highest tax rates. The same pattern appears in 2006-2011 data for 9,022 multinational firms from 87 countries (Markle and Shackelford, 2014). One limitation of this type of evidence is that the

⁴ For example, Graham (1996), Desai et al. (2004a, 2016), and others report that higher corporate tax rates are associated with greater U.S. corporate borrowing; and Graham (2000) calculates that U.S. corporations could double their tax benefits by borrowing more than they do.

sample includes only profitable corporations, so the study does not incorporate the tax consequences of losses, and in particular the generally asymmetric nature of corporate tax systems that tax gains but permit only incomplete deduction of losses. This evidence nonetheless offers useful information, and its results are consistent with the very high statutory Japanese corporate tax rates, and Japanese taxation of worldwide corporate income, during the earlier years of the sample period.

Large corporations account for most U.S. corporate income and corporate tax payments, but it is useful also to consider the relative tax burdens of smaller companies in different countries. The World Bank reports annual information on the tax obligations that would be imposed on the same hypothetical small manufacturing company (with well-defined financial and operational characteristics) over the first two years of operation in each of 190 countries. The results consistently indicate that U.S. tax burdens are among the highest in the OECD; and findings for 2017 (World Bank, 2017) are that the hypothetical manufacturing firm if located in the United States would face an average tax rate of 28.1 percent, second only to New Zealand's 30.0 percent among OECD countries. While this exercise strictly speaking applies just to a single very specific type of business entity, its results are likely to carry implications for many other businesses; and there is cross-country evidence (Djankov et al., 2010) that these estimated tax rates are correlated with lower rates of business formation and investment.

There are two direct implications of high U.S. business tax burdens. The first is that with its high tax rates and worldwide tax system the United States is not in a competitive tax position to attract internationally-mobile firms and economic activities. Firms that can readily choose their locations have incentives not to be taxed by the United States. This is most evident with corporate inversions, in which corporations undertake transactions designed to change their tax homes, leaving the United States for foreign countries with lower tax rates and territorial tax systems (Desai and Hines, 2002). And the corporate inversion phenomenon is only the most obvious manifestation of tax-motivated location choice. There is ample evidence that levels and locations of foreign direct investment are highly responsive to local tax rates (Desai et al., 2004b; Hebous et al., 2011), and that multinational firms located in countries with worldwide tax systems and high tax rates are less capable than other firms of competing for foreign investment in low-tax locations (Hines, 1996; Barrios et al., 2012). The international effects of the current

U.S. tax system are therefore to discourage investment in the United States relative to other countries, and to reduce the extent to which U.S.-based firms invest in other countries.

The second, and even more direct, implication of high U.S. tax burdens is that the U.S. tax system discourages domestic business activity in the United States, and does so to a greater degree than do the tax systems of other countries. High corporate tax rates reduce rates of business formation and levels of capital investment (Da Rin et al., 2011; Bond and Xing, 2015; House et al., 2017), which in depressing economic output and labor demand thereby reduce living standards. Diamond and Mirrlees (1971) call attention to the inefficiency of taxing business income when governments have sufficient alternative tax instruments available, since it is possible to obtain the same tax revenue at lower net cost by imposing taxes directly on individuals rather than indirectly via business taxes whose costs individuals ultimately bear. In the Diamond-Mirrlees framework individual taxation is more efficient than business taxation notwithstanding the fact that individual taxes reduce incentives for income production; the point of the Diamond-Mirrlees analysis is that business taxes similarly reduce incentives for individual income production by depressing pretax real wages – and business taxes in addition discourage business activity. Since the magnitude of the inefficiency increases with the size of business tax burdens, it follows that the United States has the potential significantly to improve the efficiency of its tax system by reducing its business taxes and obtaining needed revenue from other sources.

3. The Structure of Business Taxation

Business taxes affect incentives for business formation, expansion, and operation, which is why reforming poorly structured business taxes offers the prospect of improving resource allocation. Efficient business taxation minimizes the harmful consequences of taxation, albeit in a decidedly second-best fashion, since virtually any effort to collect tax revenue from the business sector distorts the economy. Conditional on raising any given amount of business tax revenue, efficient business taxes align private incentives with social costs and benefits, adjusts for market failures, and seeks to impose the heaviest tax burdens on activities that are least responsive to taxation.

An efficient business tax system will impose tax burdens that differ based on the nature of business activity, since activities are associated to differing degrees with socially beneficial or harmful spillovers, and generally differ in the extent to which they respond to taxation. For example, business research and development is commonly thought to stimulate economic productivity to a degree not entirely captured by firms performing the R&D, which is why governments offer R&D tax credits and immediate deductibility of 100 percent or more of R&D expenditures, thereby encouraging greater levels of R&D (Rao, 2016). Analogously, efficient tax systems impose higher rates of taxation to discourage environmental pollution and other activities with negative externalities. To the extent that some firms operate in imperfectly competitive markets, the implied efficient adjustment is to reduce their taxes in order to stimulate greater output (Auerbach and Hines, 2003), notwithstanding the oligopolistic profits that these firms earn and the need to raise other taxes in order to compensate for lower taxes on firms in oligopolistic markets, because the inefficiency created by imperfect competition takes the form of restricted output.

In addition to correcting for economic spillovers and market failures, efficient business taxes impose burdens that differ across activities, firms, and industries based on the extent to which they respond to taxation. Most OECD countries, and all major capital exporting countries other than the United States, exempt from home country taxation all or virtually all of the foreign incomes of their resident businesses. There are two efficiency-based reasons for exempting foreign income from home country taxation, the first being the highly tax-sensitive nature of foreign direct investment, and the second the potential efficiency cost of distorting patterns of capital asset ownership (Desai and Hines, 2003). One practical concern about the United States adopting a territorial tax system that would exempt foreign income from U.S. taxation is that such a change would offer greater encouragement for U.S. taxpayers to relocate taxable income from the United States to low-tax foreign locations. There is considerable controversy about the current extent of tax-motivated international income reallocation, and therefore the degree to which it might increase with the adoption of territorial taxation, though recent evidence (Dharmapala, 2014; Hines, 2014) suggests that the magnitude of this problem is quite modest.

In addition to exempting foreign income from taxation, efficient business taxes would distinguish tax burdens by industry, for example imposing lighter tax burdens on mobile

manufacturing activity than on relatively less-mobile service activity – a function partially served currently in the United States by the domestic production activities deduction that permits an additional deduction of 9 percent of manufacturing income. Capital investment incentives in the form of current U.S. bonus depreciation that permits firms to deduct 50 percent of the expense of eligible equipment investment, and rapid depreciation of other investment expenses, encourages economic activity by firms in capital-intensive industries and lines of business, implicitly at the expense of firms in other industries and lines of business. Similarly, to the extent that levels of investments that are more readily debt financed are themselves more responsive to taxation than are other typical business investments, it follows that an efficient tax system would offer more generous treatment to interest expenses than to the cost of equity finance.

It is useful to consider more specifically the incentives created by business taxes. These taxes reduce after-tax business receipts and also reduce after-tax costs, since businesses are entitled to deduct at least a portion of costs against their taxable incomes. Consider the case in which a firm produces output with the production function $q(\mathbf{x})$, in which \mathbf{x} is a vector of n inputs, purchased at input price vector \mathbf{p} , and output q is defined to have a price of unity. Firms are permitted to deduct a portion α_i of the cost of each input i , whereas all of the firm's output is taxable, as a result of which the firm's after-tax profits are given by

$$(10) \quad (1 - \tau)q(\mathbf{x}) - \sum_{i=1}^n (1 - \tau\alpha_i) p_i x_i .$$

The first-order condition corresponding to the profit-maximizing interior choice of each input is then obtained by differentiating both sides of (10) with respect to x_i :

$$(11) \quad \frac{\partial q(\mathbf{x})}{\partial x_i} = \frac{(1 - \tau\alpha_i)}{(1 - \tau)} p_i .$$

Equation (11) is a standard expression of the effect of income taxes on input demands. For example, in the case of fully-deductible expenses, such as normal wages and salaries paid by a profitable firm, $\alpha_i = 1$ and equation (11) simplifies to $\frac{\partial q(\mathbf{x})}{\partial x_i} = p_i$, which indicates that the firm

hires labor up to the point that its pretax marginal product equals the pretax cost of an additional unit of labor input. In the case of equity-financed capital investment, the one-period pretax cost of a unit of capital is $(r + \delta)$, in which r is the firm's discount rate and δ is the depreciation rate of capital, $\alpha_i = z$, the present discounted value of depreciation allowances, and equation (11)

implies that $\frac{\partial q(\mathbf{x})}{\partial x_i} = \frac{(1 - \tau z)}{(1 - \tau)}(r + \delta)$, a version of the familiar Hall-Jorgenson (1967) after-tax cost of capital formula.

In practice there are many circumstances in which input demands as expressed in (11) are captured by values of α_i that are above or below one, with capital investment being the obvious example but by no means the only important case. There are restrictions on the ability of taxpayers to claim deductions for expenses, the most important being the inability of loss-making firms to claim deductions for all of their expenses. This arises because the tax system is asymmetric, with business profits taxable but taxpayers seriously limited in the extent to which they are entitled to claim refunds for tax losses. A firm that incurs labor and materials expense of \$1 million in year one in order to obtain sales receipts of \$1.5 million in year three is permitted to carry forward its year one loss of \$1 million to reduce its year three taxable income to \$0.5 million, thereby effectively permitting the firm to deduct its year one expense (albeit without an adjustment for the time value of money). If instead of having certain sales of \$1.5 million in year three the otherwise risk-neutral firm had a fifty percent chance of receiving zero in year three and a fifty percent chance of receiving \$3 million, the firm would either owe taxes on \$2 million of profits or be untaxed, thereby effectively enjoying the benefits of cost deductibility only half the time, corresponding to a value of α_i equal to roughly 0.5. Given the large and growing magnitude of nonrefundable U.S. corporate tax losses relative to taxable U.S. corporate profits (Altshuler et al., 2009), it follows that the expenses of representative U.S. firms are only partially deductible in expectation. This system effectively imposes higher tax burdens on firms that are less certain to be profitable and therefore able to claim the full value of their tax deductions; such a pattern is consistent with efficient taxation if the activities of these firms are less tax-responsive than others, and quite inconsistent with efficiency if they are more tax-responsive.

Equation (11) describes a set of input demands as functions of $\tilde{\mathbf{p}}$, the vector of tax-adjusted input prices that appear on the right side of (11). More generally, the vector of input demands can be written as $\mathbf{x}(q, \tilde{\mathbf{p}})$, reflecting that input demand is a function of a firm's chosen output level, and that for any given quantity of output the firm's choice of inputs is a function of relative after-tax prices. In order to understand the effect of specific tax provisions it is helpful to decompose their effects on input demands into substitution and scale of operation effects. The effect on of a change in the tax price of input i on demand for that input is given by:

$$(12) \quad \frac{dx_i(q, \tilde{\mathbf{p}})}{d\tilde{p}_i} = \frac{\partial x(q, \tilde{\mathbf{p}})}{\partial \tilde{p}_i} + \frac{\partial x(q, \tilde{\mathbf{p}})}{\partial q} \frac{dq}{d\tilde{p}_i}.$$

Equation (12) illustrates that changes to the tax price of an input affect demand for that input in two ways: by encouraging input substitution at any given output level, and by changing the production levels of firms using the input more and less intensively. Thus, the research tax credit stimulates R&D both by encouraging firms to select R&D-intensive processes to produce any given level of output, and by subjecting R&D-intensive firms to lower tax rates than other firms, thereby expanding their scales of output; and there is no presumption about which of these two channels has the greater effect on total R&D.

Efficiency-minded tax reform selects both the level and design of business taxes. High current rates of U.S. business taxation imply that economic gains are available from reducing U.S. business taxes and using other taxes to recoup the lost revenue. The distributional consequences of such a change would of course depend on the specific nature of any business tax reductions and which other taxes were used to raise the needed revenue; but with a progressive individual income tax at its disposal the U.S. government could make this combination of tax changes more or less progressive than current taxes. In addition to adjusting the level of business taxation, a tax reform intended to improve economic efficiency would maintain and in some cases increase the differentiation of tax burdens across business activities, firms, and industries, notably by exempting the foreign incomes of U.S. firms, but more generally by offering favorable tax treatment of highly responsive economic activity.

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Table 1
Corporate Tax Rates, OECD Countries, 2017

| Country | Tax Rate (%) |
|----------------|---------------------|
| United States | 38.91 |
| France | 34.43 |
| Belgium | 33.99 |
| Germany | 30.18 |
| Australia | 30.0 |
| Mexico | 30.0 |
| Japan | 29.97 |
| Portugal | 29.5 |
| Greece | 29.0 |
| New Zealand | 28.0 |
| Italy | 27.81 |
| Luxembourg | 27.08 |
| Canada | 26.7 |
| Austria | 25.0 |
| Chile | 25.0 |
| Netherlands | 25.0 |
| Spain | 25.0 |
| Korea | 24.2 |
| Israel | 24.0 |
| Norway | 24.0 |
| Denmark | 22.0 |

| | |
|-----------------|-------|
| Sweden | 22.0 |
| Switzerland | 21.15 |
| Slovak Republic | 21.0 |
| Estonia | 20.0 |
| Finland | 20.0 |
| Iceland | 20.0 |
| Turkey | 20.0 |
| Czech Republic | 19.0 |
| Poland | 19.0 |
| Slovenia | 19.0 |
| United Kingdom | 19.0 |
| Latvia | 15.0 |
| Ireland | 12.5 |
| Hungary | 9.0 |

Note: Table 1 presents combined national and subnational statutory corporate tax rates for OECD countries in 2017. Source: OECD.

Table 2
U.S. Corporate Tax Burdens

| Fiscal Year | Corporate Tax Expenditures | Tax Expenditure Credits | Corporate Tax Revenues | U.S. Corporate Tax Rate | Burden Equivalent Tax Rate 1 | Burden Equivalent Tax Rate 2 |
|--------------------|-----------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------------|-------------------------------------|
| 2017 | \$ 100.6 b | \$ 27.5 b | \$ 409.9 b | 38.9 | 31.2 | 34.6 |
| 2016 | \$ 95.0 b | \$ 24.9 b | \$ 299.6 b | 38.9 | 29.4 | 33.5 |
| 2015 | \$ 54.4 b | \$ 19.5 b | \$ 343.8 b | 39.0 | 33.7 | 36.2 |
| 2014 | \$ 48.5 b | \$ 20.5 b | \$ 320.7 b | 39.1 | 34.0 | 36.4 |
| 2013 | \$ 91.5 b | \$ 21.8 b | \$ 273.5 b | 39.1 | 29.1 | 33.3 |
| 2012 | \$ 95.8 b | \$ 18.3 b | \$ 242.3 b | 39.1 | 27.7 | 32.2 |
| 2011 | \$ 126.3 b | \$ 20.9 b | \$ 181.1 b | 39.2 | 22.1 | 27.6 |
| 2010 | \$ 63.8 b | \$ 15.8 b | \$ 191.4 b | 39.2 | 29.3 | 33.4 |
| 2009 | \$ 73.8 b | \$ 14.2 b | \$ 138.2 b | 39.2 | 25.0 | 30.2 |
| 2008 | \$ 83.6 b | \$ 13.2 b | \$ 304.3 b | 38.9 | 30.4 | 33.9 |
| 2007 | \$ 68.8 b | \$ 19.5 b | \$ 370.2 b | 39.3 | 33.1 | 35.9 |
| 2006 | \$ 72.1 b | \$ 10.6 b | \$ 353.9 b | 39.3 | 32.6 | 35.5 |
| 2005 | \$ 55.7 b | \$ 11.9 b | \$ 278.3 b | 39.3 | 32.7 | 35.6 |

Note: the first column of the table presents the sum of U.S. corporate tax expenditures, excluding those associated with deferral of foreign income and the favorable taxation of interest on state and local bonds. Column two presents the sum of U.S. corporate tax expenditures that consist of tax credits. The third column presents U.S. corporate tax collections. The fourth column presents U.S. federal plus average state statutory corporate tax rates as reported by the OECD. The fifth column presents estimated lower bound burden-equivalent U.S. corporate tax rates; these are the tax rates that, if unaccompanied by corporate tax expenditures, would produce corporate tax burdens equivalent to those prevailing in the United States during the same fiscal

years. The sixth column presents the estimated upper bound on burden-equivalent tax rates. Figures for fiscal year 2017 are based on projections.

Sources: U.S. Department of the Treasury (tax expenditures), OECD (statutory tax rates), and Economic Report of the President (2017) (corporate tax revenues).