



Tax Policy Center
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Corporate Tax Incidence and Its Implications for Progressivity¹

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Section I. Introduction

The corporate income tax serves several purposes. The tax acts as a mechanism for collecting tax revenue and diversifies the tax system; it serves as a backstop against evasion by high-income taxpayers; and, according to some economists, it bolsters tax progressivity.² The latter notion—that the corporate tax increases progressivity—generally derives from the assumption that the tax falls fully on capital and the observation that capital ownership tends to be concentrated among wealthier individuals. The subsequent debate over corporate tax progressivity, then, is whether the assumption that capital bears the tax burden holds. If not and labor bears the burden of the corporate tax, the corporate tax is no longer progressive, and a primary reason for its existence is called into question. A recent paper by Carroll (2009) notes:

The answer to the question – “Who bears the burden of the corporate income tax?” – is important because raising corporate income taxes has often been viewed as an effective way for governments to push the tax burden onto the people who can best afford it. As the conventional wisdom held, if the tax were borne primarily by owners of capital who tend to have higher incomes, then a high corporate income tax would make the tax system more progressive.

Unfortunately, economists disagree about the incidence of the corporate income tax and consequently about whether the corporate tax makes the tax code more progressive.

Determining who bears the burden of the corporate income tax is a complicated exercise. The corporate tax can influence the investment decisions of capital owners, how companies finance investment, and the international allocation of capital, and these effects can vary not only across countries but also across sectors. Changes in firm and investor decisions can then affect wages, output prices, and levels of investment, which in turn can influence the terms of trade. In sum, the complex set of economic interactions makes it difficult to isolate the impact of the corporate tax on the return to capital and land, wage rates, and consumer prices.

Until recently, researchers built models of varying complexity to predict the impact of the corporate tax on the equilibrium allocation of capital and to measure the effect of the consequent change in capital allocation on wages, output prices, and return to capital. Researchers then used the models’ results to draw conclusions about the relative burden falling on capital versus labor. These theoretical papers tended to reach very different conclusions about the burden of the corporate tax depending on model structure and underlying assumptions.

In the past several years, researchers have attempted to estimate the incidence of the corporate income tax empirically. The primary approach used in empirical papers has been to examine cross-country variation in the corporate tax rate over time and measure subsequent changes in wage rates. All of the recent empirical papers have found that

² Slemrod (2004) notes that the corporate tax has other potential benefits as well, including its role as a tax on economic profits, a withholding tax on corporate source income, and a user tax on businesses for government activities.

corporate taxes lead to depressed wages, but critics have questioned the validity of the empirical methodology. To date, there remains little, if any, consensus about who bears the burden of the corporate tax.

This paper reaches three related conclusions. First, because wage and capital income are highly correlated, higher-income taxpayers will pay a relatively larger share of the tax, regardless of whether the corporate income tax falls on labor or capital. Second, even if capital income is broadly defined to include income accrued to tax-preferred retirement accounts, this conclusion is little-changed. Third, the incidence of the corporate tax has only a modest effect on overall progressivity simply because the tax collects only a small fraction of federal revenues.

The paper uses the Tax Policy Center microsimulation model to estimate the progressivity of the corporate tax—and the tax code in general—under the alternative assumptions that capital bears 20 percent, 50 percent, or 80 percent of the corporate tax burden. Under all three assumptions, average corporate tax rates generally rise with income, indicating progressivity.

In addition, this paper presents simulations under alternative assumptions about the definition of capital income; simulations are performed with capital from retirement saving accounts both included and excluded from tax units' capital share. Broadening the definition of capital income does little to change the pattern of average corporate and federal tax rates increasing in income.

Furthermore, because the corporate income tax is small relative to other tax sources, assumptions about corporate tax incidence have little effect on the overall progressivity of the tax code. This paper illustrates this point by estimating average corporate tax rates under the assumption of doubled corporate tax revenue relative to the baseline. This scenario only modestly changes the tax code's overall progressivity.

These conclusions form a single lesson about corporate tax incidence and progressivity: while corporate tax incidence may affect the allocation of resources across sectors and borders, it has little impact on the corporate tax's progressivity. Even under drastically differing assumptions, the corporate tax is a progressive aspect of the tax code.

Section II: Why is There No Consensus on Who Pays the Corporate Tax?

Most economic studies of corporate tax incidence acknowledge that capital will bear the bulk of the burden in the short run, but there is little consensus about the long-run incidence of the tax. The literature offers no clear picture of which factor of production bears the burden of the tax; reasonable estimates of the share borne by labor range from none to over 100 percent. Surveys of economists do not help to clarify the issue. Slemrod (1995) reports that a 1994 survey of economists found that 75 percent of respondents believe that corporate income taxes are “largely passed on to consumers and workers.” In a somewhat contradictory finding, Fuchs, Krueger, and Poterba (1998) report that the mean estimate of the corporate tax incidence falling on capital among public finance economists was 41.3 percent. However, the authors also find substantial variation in economists' estimates of corporate tax incidence, and conclude that “The

responses suggest that public finance economists believe that the corporate income tax is borne by both capital and labor, but that there is significant disagreement about the precise division.”

Government agencies have not helped to clarify this point. The Joint Committee on Taxation does not assign corporate tax incidence to individuals; the Congressional Budget Office (CBO) and Treasury assign the entire burden of the corporate tax to capital owners in proportion to their share of aggregate capital income.³ Gravelle and Smetters (2006) note that the uncertainty surrounding corporate tax incidence induced CBO to prepare two sets of distributional estimates: one assuming the entire incidence was borne by labor and another assuming the entire incidence was borne by capital. Later CBO would divide the incidence between capital and labor, before settling on its current practice of assigning the entire burden to capital.

Researchers have followed two broad approaches to measure the incidence of the corporate income tax. One method uses theoretical economic models to determine how a hypothetical corporate tax might affect the equilibrium allocation of capital; the other method relies on observed empirical evidence relating corporate tax rates to changes in wage rates. The theoretical studies obtain mixed results, while the empirical work concludes that labor (or wage-earners) bears the bulk of the corporate tax burden.

This section aims only to show why estimating corporate tax incidence is complex; it does not offer a complete survey of past efforts. Others have compiled outstanding reviews of the literature. Gravelle (2008) outlines the development of research into corporate tax incidence over the past several decades. Zodrow (1999) provides an overview of the issues surrounding economic modeling of tax incidence. Gentry (2007) surveys recent empirical studies of corporate tax incidence; Gravelle and Hungerford (2008) critique them. Auerbach (2007) discusses the complications of estimating corporate tax incidence.

The complexity of theoretical studies results from the range of potential changes that can occur in response to a tax on capital income. In a seminal study of corporate tax incidence, Harberger (1962) shows that in a simple closed-economy model with two sectors (one taxed, one untaxed), a tax on corporate income in one sector would cause investors to shift capital from the taxed sector to the untaxed sector. That simple result becomes more complicated, however, as the initial reallocation of capital leads to a reallocation of labor and different levels of output in each sector. The new allocations lead to price changes for capital, labor, and output, all of which in turn affect the equilibrium welfare of individuals. Moreover, Harberger shows that the pattern of factor reallocation and the subsequent price changes depend critically on the initial proportional allocation of labor and capital, the rate at which each industry can substitute labor and capital, and the elasticity of demand for each of the goods produced in the respective market. Moreover, Harberger shows that not only do these allocations and elasticities matter, but that the relationship of elasticities and factor allocations to other elasticities

³ For example, CBO (2007) notes “CBO assumes that owners of capital bear the economic burden of corporate income taxes in proportion to their income from capital, measured as interest, dividends, rents, and adjusted capital gains.”

and factor allocations can be critical in determining the burden of the corporate tax that falls on labor versus capital.

Harberger's early model of corporate tax incidence is perhaps the simplest of all notable corporate tax incidence models. Extending the model to include foreign sectors (i.e., assuming an open economy) complicates determining who ends up bearing the tax burden. In an open economy, a corporate tax might cause capital to shift away from the corporate sector not only to the domestic non-corporate sector, but to international sectors as well. The extent to which that occurs depends on many factors, such as domestic consumers' willingness to substitute foreign goods for domestic goods and the rate at which firms can trade off between domestic labor and capital.⁴

Multiple studies have simulated corporate tax incidence in an open economy (see Table 1).⁵ Randolph (2006) builds a two country, five-sector model with three factors of production (capital, labor, and land). The five sectors include a corporate sector producing tradable goods that are perfect substitutes with foreign goods; a corporate sector producing tradable goods that are not perfect substitutes with foreign goods; a corporate sector with goods that are not tradable⁶ (e.g., utilities); a non-corporate sector producing tradable goods (e.g., agriculture); and a non-corporate sector producing non-tradable goods (e.g., residential housing). The corporate sectors are taxed, the non-corporate sectors are not. Randolph assumes that capital is perfectly mobile across countries, labor is immobile, and markets are perfectly competitive.

Randolph estimates how a tax on the corporate sector affects the equilibrium cost of capital, which in turn affects the allocation of factors of production across sectors, the equilibrium wage rate and land rents, output prices and consumer demand. Randolph then measures how this change in prices—both factor prices and consumer prices—alters consumption by foreign and domestic owners of each input; this change forms the basis of the incidence calculation. Randolph's results are largely dependent upon the mobility of capital across borders, but also depend upon the ability of the domestic economy to influence world prices and the capital intensities in the domestic corporate sector.

Randolph finds that under baseline assumptions, domestic labor bears the bulk of the tax—74 percent—while domestic capital bears 33 percent of the burden, expressed as a share of revenue. Land benefits with a -3 percent burden, as does foreign labor with a burden equal to -71 percent of revenue. Foreign capital bears a burden of 72 percent. Randolph also produces estimates assuming different relative capital intensities of the domestic corporate sectors, and finds that the burden falling on domestic labor can vary between 59 percent and 91 percent, while the burden falling on domestic capital can vary between 38 percent and 27 percent. He also produces estimates under an infinitesimal tax rate and with varying assumptions about whether the domestic country is a net capital borrower or lender.

⁴ Harberger (2006) argues that closed economy models are appropriate in the context of coordinated tax policy between a subset of countries comprising a large portion of the world economy. In other circumstances, closed economy models are more appropriate.

⁵ Notable theoretical studies not addressed in this paper include Bradford (1978), Harberger (1995), Harberger (2006), Melvin (1982), and Mutti and Grubert (1985).

⁶ "Tradable" refers to whether the goods are traded on an international market. All goods are traded domestically.

Gravelle and Smetters (2006) estimate corporate tax incidence under a scenario where internationally tradable goods are imperfect substitutes. Using a general equilibrium framework, the authors present incidence results under varying assumptions for portfolio substitution elasticity and the elasticity of internationally tradable goods.⁷ Specifically, the authors allow the tradable product substitution elasticity to equal 1, 3, or 100 (essentially perfect substitution) and the portfolio elasticity to equal 0.1, 3, or 100. Gravelle and Smetters find that capital—both foreign and domestic—bears the bulk of the incidence when elasticities are low and that domestic factors of production bear the burden when elasticities are high. For example, they find that when both elasticities are low (product substitution elasticity equal to 1 and portfolio elasticity equal to 3), domestic labor bears -3 percent of the burden and domestic capital bears 91 percent, while foreign factors bear very little burden as well. Conversely, they find that when the elasticities are infinite, domestic labor bears 71 percent of the burden, domestic capital bears 36 percent of the burden, foreign labor bears -67 percent of the burden and foreign capital bears 66 percent of the burden. In all cases land bears a relatively small proportion of the burden. The authors conclude that prior research supports adopting a product substitution elasticity to 1, which indicates that domestic capital bears between 71 percent and 91 percent of the burden.

Gentry critiques several aspects of the Gravelle and Smetters study. He notes that the long-run substitutability between domestic and foreign goods is large, so assuming that product substitution elasticity is high may be appropriate. Gentry also notes that adding additional corporate sectors to the model can mitigate the impact of low product substitution elasticity and raise the incidence on labor. Another criticism of the study, not raised by Gentry, concerns the paper's treatment of the transitory effects of capital reallocation. By omitting the deterioration in the exchange rate that results from exporting capital abroad, the paper ignores the negative effects of weakened purchasing power by domestic wage earners.

Despite the complexity inherent in the various relevant general equilibrium models, the fundamental conclusions remain the same: if it is feasible and profitable for capital to avoid a tax by shifting to other sectors, then the burden will fall primarily on labor, assuming labor is immobile. The extent to which a shift is feasible and profitable depends on a variety of assumptions, which drive any conclusions about corporate tax incidence. Because there is no real consensus on the underlying assumptions, there can be no real consensus on tax incidence.

Empirically measuring corporate tax incidence sidesteps problems associated with general equilibrium simulations. Several recent papers have used international panel data to estimate the impact of corporate taxes on employee wages and earnings. Hassett and Mathur (2006) and Felix (2007) utilize aggregate-level data to estimate the impact of corporate tax revenue on wages. Desai, Foley, and Hines (2007) and Arulampalam, Devereux, and Maffini (2009) use firm-level data to estimate the impact of corporate revenue paid on employee wages. While the studies differ in their methodologies and

⁷ The authors note that their results depend in part on the two elasticities listed above, plus the production factor substitution elasticity and the consumer's preference elasticity between different products. In their baseline estimates, they set the factor substitution elasticity and the consumer's preference elasticity equal to 1 and vary the elasticities mentioned above.

data, they reach a consistent conclusion: the corporate tax is borne largely by labor through reduced wages or earnings, although the mechanism by which this theoretically occurs varies across studies.⁸

Hassett and Mathur use a panel data set of 72 countries over 25 years to test the effect of corporate taxes on manufacturing wages. Using average nominal wages over five-year periods as the dependent variable, the authors find that the corporate tax has a strong negative effect on employee wages, but that this effect varies considerably with how they define the corporate tax. Using the top corporate tax rate to measure the corporate tax, Hassett and Mathur find a substantial effect: a 10 percentage point increase in the corporate tax leads to a 25 percent reduction in wages. Other definitions, including average and effective corporate tax rates, produce weaker relationships.

Felix (2007) follows a similar methodology to Hassett and Mathur, but uses household survey data from 19 different countries from 1979 to 2002. The study measures the effect of the corporate tax rate on annual household earnings, classifying earnings as low, medium, or high to isolate the impact of the corporate tax on various worker skill-groups and measuring the corporate tax by the top statutory tax rate. Like Hassett and Mathur, Felix also specifies a model with average tax rate to measure the impact of the corporate tax on wages and also includes a measure of an economy's openness as an explanatory variable. She finds no statistically significant relationship when she accounts for an economy's openness: she finds a one percentage point increase in the top statutory rate leads to a -0.71 to -1.23 percentage point decrease in average household annual wage.

Both the Hassett and Mathur and Felix studies received criticism, most notably by Gravelle and Hungerford (2008). Gravelle and Hungerford re-estimate the Hassett and Mathur model using both purchasing power parity (PPP) and inflation-adjusted PPP to adjust wages, as opposed to Hassett and Mathur's approach of using exchange rates. Under these specifications, Gravelle and Hungerford find much weaker relationships between the corporate tax and manufacturing wages. Gravelle and Hungerford also note that about one-third of Hassett and Mathur's five-year observations were based on less than five years of data due to missing data, and re-estimate the model using only observations for which the five years of data exist. They find no significant effect of the corporate tax on manufacturing wages. Lastly, Gravelle and Hungerford estimate the model using annual data, rather than five-year averages, and find no significant effect.

Gravelle and Hungerford list several problems with the study by Felix. Specifically, they note that the study (1) does not control for country-fixed effects, (2) uses an unusual patchwork sample of 65 observations over 19 years with many countries having only one or two years of data, and (3) produces estimates of corporate tax burden (about \$4 in tax burden for every \$1 in tax revenue collected) that are far too large to be predicted by a theoretical model; they also raise the latter criticism with regard to the Hassett and Mathur study.

⁸ Carroll (2009) briefly examines the relationship between state-level corporate taxation and state-level wages, and finds that states with higher corporate taxation tend to have lower wages. Carroll finds that each \$1 in corporate tax revenue lowers hourly wages by \$2.50. However, such a finding implies that there is no national equilibrium wage, and that labor is not mobile across state borders. Such an implication seems inappropriate for the U.S. labor force.

While Hassett and Mathur and Felix use aggregate level wages to measure the corporate tax's impact, Desai, Foley, and Hines and Arulampalam, Devereux, and Maffini use multinational firm-level data to measure the effect of corporate taxes on wages. Desai, Foley, and Hines use panel data on foreign affiliates of American multinational firms to measure the extent to which the corporate tax burden is shared between labor and capital. The data encompass observations spanning 25 years and 50 countries. The authors use seemingly unrelated regressions for capital and labor and employ a restriction that the sum of the burden on wages and capital must equal the total tax effect. They find that between 45 and 75 percent of the corporate tax burden falls on labor (57 percent in the baseline specification).

Arulampalam, Devereux, and Maffini attempt to estimate the effects of the corporate tax on wages through bargaining. They hypothesize that firms and workers bargain over economic rents and that the corporate tax can change the outcome. Using data on approximately 55,000 firms operating in nine European countries, they measure the effect of taxes paid by firms (as opposed to corporate tax rates) on employee compensation. Since they use firm-level data, they cannot measure the general equilibrium effects on the wage rate, but rather the impact on the outcome of the worker and firm bargain over economic rents. The authors find that, under the preferred specification, the elasticity of employee compensation with respect to corporate tax rates per worker, is -0.120 in the short-run and -0.093 in the long-run. These elasticities correspond to corporate tax incidence measures on labor of 97 percent and 75 percent, respectively.

Gravelle and Hungerford note several reservations with the firm-level approach. Gravelle and Hungerford criticize the Desai, Foley, and Hines study on several accounts, including representing the incidence borne by labor only with firm-level changes in wages and measuring capital income only with interest. They also note that the study's results are driven by the restriction that the combined (labor and capital) burden of the corporate income tax equals 1; relaxing that restriction makes the results insignificant.⁹

Gravelle and Hungerford criticize an earlier version of the Arulampalam, Devereux, and Maffini study on the grounds that there is a disconnect between the study's theoretical effect of the corporate tax (i.e. that it affects the wage bargain between labor and firms) and the authors' estimation process of modeling wages as a function of output and taxes. They note that this estimation strategy measures only the short-run incidence of the corporate tax, not the long-run impact on the equilibrium division of economic rents. Gravelle and Hungerford further criticize the results as implausible, noting that the short-run elasticity of corporate taxes on wages cannot be high given multi-year wage contracts. Lastly, Gravelle and Hungerford criticize the use of short-run panel data and the "widely varying" results obtained by the paper.

Gentry also cites several reservations with the recent empirical literature. He agrees with Gravelle and Hungerford's assertion that these studies capture the short-run incidence of the corporate tax, while theory indicates that the mechanism by which labor

⁹ The authors refer to comments made by Bill Randolph at a March 2008 seminar at the American Enterprise Institute, where Randolph stated that without the restriction, the Desai, Foley, and Hines results were no longer significant.

bears the tax (notably an adjustment in equilibrium wage levels) would likely require several years to adjust. Gentry and Gravelle and Hungerford also agree in pointing out that using firm-level data can only measure partial effects because it ignores economy-wide price effects. Gentry also raises concerns about the causality of corporate tax rates on wages, noting instead that governments could shift towards higher capital taxation immediately before returns to wages fall. Lastly, Gentry notes that the findings in these papers are much larger than the *a priori* expectations would suggest, and that these magnitudes far exceed the plausible ranges predicted by general equilibrium models.

Section III. Methodology and Description of the TPC Model

The Tax Policy Center (TPC) microsimulation model uses two primary data sources: the 2004 public-use file (PUF) produced by the Statistics of Income (SOI) Division of the Internal Revenue Service and the 2005 Current Population Survey (CPS). The PUF contains 150,047 income tax records with detailed information from federal individual income tax returns filed during 2004. It provides key data on the level and sources of income and deductions, income tax liability, marginal tax rates, and use of particular credits, but it excludes certain demographic information, such as age, and most information about pension wealth and contributions. TPC uses a constrained statistical match with the March 2005 CPS of the U.S. Census Bureau to map non-tax information onto the PUF.¹⁰

To model retirement saving, TPC supplements the PUF and CPS data described above with information from the 2001 Federal Reserve Board of Governors' Survey of Consumer Finances (SCF) and the Survey of Income and Program Participation (SIPP). The model's principal data source for type of pension, pension participation and accumulated wealth, and contributions by employers and employees is the SCF, a stratified sample of about 4,400 households with detailed data on wealth and savings. The SCF has the best available data on pensions for a broad cross-section of the population, but does not report enough information to determine eligibility for deductible IRA contributions. To measure eligibility and contributions to IRAs, TPC uses selected pooled data from the 1984, 1990, 1992, and 1996 SIPP. Burman *et al.* (2004) describes TPC's retirement saving estimation procedures in greater detail.

To measure returns to capital in retirement saving accounts, the TPC model first imputes the total accrued value of each tax unit's retirement savings accounts. Then, the model imputes a measure of proportional allocation across different asset classes (i.e., assets bearing interest, capital gains, and dividend income) by age and retirement account balance. A rate of return, based on historical trends, is assumed for each asset class; these

¹⁰ The statistical match provides important information not reported on tax returns, including measures of earnings for head and spouse separately, their ages, the ages of their children, and transfer payments. The statistical match also generates a sample of individuals who do not file income tax returns ("nonfilers"). By combining the dataset of filers with the dataset of estimated nonfilers from the CPS, we are able to carry out distributional analysis on the entire population rather than just the subset that files individual income tax returns.

rates are then multiplied by the respective balances (by asset class) to determine the capital income accruing to each household from retirement saving accounts.

The standard corporate tax assumption in the TPC model—which is relaxed in this paper—is that the burden of the corporate tax falls on all owners of capital in proportion to their share of aggregate capital income.¹¹ In its baseline calculations, the model first determines each return’s share of aggregate capital income, which the model defines as taxable and tax-exempt interest, dividends, realized capital gains, and net income from rents, royalties, and estates or trusts.¹² Each tax unit’s corporate tax burden then equals total corporate tax liability multiplied by the unit’s share of aggregate capital income. Thus, a tax return that reports 0.05 percent of aggregate capital income incurs 0.05 percent of aggregate corporate tax liability. The model then projects corporate tax liability from CBO estimates of aggregate corporate tax revenues. To estimate the distribution of the change in burden from a corporate tax proposal, the model simply allocates across tax units the estimated overall change in corporate tax liability.

This analysis modifies the TPC assumption that the corporate tax falls entirely on capital to examine the effects of assigning some proportion of the corporate tax burden to labor. Specifically, this adjustment calculates each tax unit’s share of aggregate capital and wage income, respectively, then assigns some proportion of the aggregate corporate tax burden to wages and some proportion to capital.¹³ Equation (1) describes the assignment of corporate tax incidence, with α representing the corporate tax incidence falling on capital, and $(1 - \alpha)$ representing the share borne by labor:

$$(1) \quad T_i = \alpha \left(\frac{c_i}{C} \right) T + (1 - \alpha) \left[\frac{w_i}{W} \right] T$$

In equation (1) T_i is each tax unit’s burden, T is exogenously determined corporate tax revenues, c_i is each unit’s capital income, C is the aggregate capital income, w_i is each unit’s wage income, and W is the aggregate wage for all tax units. TPC’s approach assumes that α equals 1; that is, capital bears the full burden of the corporate income tax. Here, I calculate the aggregate distribution of tax burdens under scenarios where capital bears none, all, and half of the corporate tax burden; that is, α is equal to 0.2, 0.5 or 0.8.

In addition, this paper presents estimates under alternative assumptions about capital share. Under the baseline assumption, a tax unit’s capital share is the sum of capital income reported on households’ tax returns. In an alternative simulation, capital

¹¹ CBO adopts this assumption and Treasury did so as well until it ceased including the corporate tax in its distributional analyses; TPC’s methodology most closely resembles that of CBO. See Cronin (1999) and JCT (1993) for summaries of the issues involved. Although JCT argued in 1993 for distributing the corporate tax to owners of corporate capital, it has abandoned distributing the corporate tax in its recent analyses of tax proposals.

¹² In order to temper the wide variations in realized capital gains that can occur across years, TPC adjusts each record’s reported realization of long-term and short-term capital gains by a factor accounting for aggregate trends in capital gains realizations. Rohaly, Carasso, and Saleem (2005) describe this adjustment in greater detail.

¹³ By design, the sum of the proportions equals 1, although this could theoretically be adjusted to allow the incidence of the corporate tax to exceed the revenues collected.

share is redefined to also include the capital income—either realized or unrealized—accruing to retirement saving accounts.

The corporate tax's low share of total tax revenues means that the distribution of its burden between capital and labor cannot have much effect on the distribution of the overall tax burden. To show that the relatively small size of the corporate income tax makes it difficult for the tax to influence progressivity, this paper presents estimates of equation (1) under the assumption that corporate tax revenues—exogenously determined—are doubled.

Section IV. Results.

Households with low or moderate wages are less likely to have income from capital gains, dividends, or interest payments; capital income more commonly goes to households with higher wages. In general, capital income is concentrated among high-wage tax units except for a smaller but significant share going to units with little or no wage income, presumably mostly retirees with substantial capital wealth. Data from the TPC model reveal a J-shaped pattern for the realization of capital income with respect to wages. The data also show median capital income increasing steeply with wages.¹⁴

This analysis shows non-retirement capital income to be generally increasing with wage income, with the exception of high mean non-retirement capital income among households with very low levels of wages. The lowest wage class reports high mean capital income: taxpayers with less than \$10,000 of wages accrue an average of \$11,309 in capital gains, dividend, and interest income (Table 2). Mean non-retirement capital income remains below \$5,000 as wage income increases up to the \$100,000 to \$200,000 wage group, for whom it exceeds \$9,000. Mean non-retirement capital income continues to rise through the rest of the wage income distribution, reaching a maximum of more than \$995,945 for households with wage income over \$1,000,000.

Including capital income accruing to retirement accounts does not markedly change the distribution of capital income. As with capital gains, dividends, and interest income, capital income from retirement accounts exhibits a generally increasing pattern in wages, with the exception of the lowest wage group. Households in the lowest wage group accrue an average of about \$2,500 in capital from retirement accounts. This amount drops to \$573 for those in the second wage group then increases progressively throughout the wage distribution. The \$50,000 to \$75,000 wage class reports nearly \$3,000 in retirement account capital income, while the top wage class reports about \$180,000 in capital income from retirement accounts.

Median capital income exhibits a similar pattern as mean capital income. After the first wage group, median capital income is increasing in wages, with the median value for capital gains, dividends, and interest income equaling 0 for most wage groups

¹⁴ Throughout this section, mean and median wages are reported by wage income level, while the distribution of average tax rates is reported by cash income percentile. The distinction is necessary since more than 20 percent of households have 0 wages, making it impossible to classify households into quintiles based on wages alone.

(Appendix Table 1). The median value for capital income in the lowest wage group is driven higher by capital accruing to retirement accounts.

Because wage and capital income are highly correlated, the assumed incidence of the corporate income tax does not affect the measured progressivity of the tax very much. Regardless of the incidence assumption, the average effective corporate tax rises with income and is thus progressive under the measures used in this analysis.¹⁵

The corporate tax is strongly progressive if it falls primarily on capital. The average effective corporate tax rate increases slowly from 1.1 percent for the lowest income quintile to 1.5 percent for the fourth quintile and then more than triples to 4.0 percent for the top quintile (Table 3). The top 1 percent of tax units pays an average corporate tax rate of 7.0 percent.

If the corporate tax burden splits evenly between capital and labor, the tax remains progressive but less so than if capital bears the bulk of the tax. In this scenario, average corporate tax rates increase from 1.6 percent for the lowest quintile to 2.2 percent for the fourth quintile and then jumps to 3.4 percent for the highest quintile and 4.9 percent for the top 1 percent.

Progressivity is less clear if labor bears the primary burden of the tax: the average corporate tax rate increases across the first four quintiles but then drops slightly for the top 20 percent. The average rate grows steadily from 2.2 percent for the lowest quintile to 2.9 percent for the fourth quintile but then drops to 2.8 percent for the top quintile. Within that top quintile, the average tax rate falls exhibits a u-shaped pattern, with the average corporate tax rate increasing through the 90th percentile, then dropping for all other percentiles except the top 0.1 percent; this group has the highest average tax rate of any group at 3.1 percent.

Including retirement account capital does little to change the patterns of increasing tax rates. As before, if labor bears the primary burden of the tax, average tax rates exhibit a strongly progressive pattern; average tax rates increase steadily with income from 1.7 percent for the lowest quintile to 3.8 percent for the top quintile (Table 4). Average tax rates increase from 1.7 percent for the lowest quintile to 3.3 percent for the top quintile when incidence is split evenly between labor and capital. When 80 percent of the incidence falls on labor, progressivity is mixed, with average tax rates increasing through the 95th percentile but falling slightly for the top 5 percent.

The incidence of the corporate tax has little effect, however, on the progressivity of federal taxes as a whole since the corporate tax accounts for less than 10 percent of total tax revenues. The effective tax rate for the bottom quintile is 4.8 percent if capital incurs the primary burden of the corporate tax and 5.9 percent if labor bears the majority of the tax (Table 3). Comparable estimates for the top income quintile are 24.6 percent and 23.4 percent, respectively. If more of the corporate tax burden falls on labor, overall federal tax progressivity falls but remains strong.

Similarly, the corporate income tax has little influence on the aggregate progressivity of the tax code because it provides only a small fraction of total revenue.

¹⁵ There are several equivalent measures of tax progressivity, including the trajectory of average tax rates across income. In a progressive tax system, average tax rates increase with income.

Even if the corporate tax collected twice as much in revenue, its impact on the pattern of average tax rates would remain small (Table 5). In the least progressive case—when labor bears the 80 percent of the corporate tax—doubling corporate tax receipts increases the average tax rate from 5.9 percent to 8.0 percent for the bottom quintile, from 18.2 percent to 23.8 percent for the middle quintile, and from 23.4 percent to 26.3 percent for the top quintile. Progressivity is little-changed.

Section V. Conclusion

Economists disagree about whether capital or labor bears the incidence of the corporate tax. Recent analysis—both empirical and theoretical—has failed to build a consensus. Theoretical models yield starkly differing results depending on underlying assumptions about factors such as the openness of the economy, the extent to which consumers substitute domestic goods for foreign ones, and the willingness of investors to substitute domestic capital for capital from abroad. For example, different elasticities of domestic and foreign product substitution can result in labor bearing either most of the burden of the corporate tax, or none at all.

Recent empirical studies have also failed to solve the corporate tax incidence puzzle. While the studies all conclude that wage earners bear most of the ultimate burden of the corporate tax, their methodological shortcomings leave their conclusions open to doubt.

This analysis has shown that the corporate tax remains a generally progressive aspect of the tax code, regardless of the incidence assumption. That is, under completely opposite assumptions that the corporate tax falls either primarily on labor or primarily on capital, average corporate tax rates for taxpayers generally increase with income, indicating progressivity. The lone exception is under a scenario where corporate tax incidence falls entirely on labor, the average tax rate drops for taxpayers in the 95th to 99.9th percentile relative to taxpayers in the fourth quintile.

Furthermore, because the corporate tax accounts for only a small share of total federal revenue, it has little effect on overall progressivity of the tax code, regardless of its incidence. Aggregate progressivity would change little, even if corporate tax receipts doubled and fell entirely on workers.

These findings do not reduce the importance of understanding corporate tax incidence. Indeed, that incidence critically influences the effect of the tax on the allocation of capital and labor both domestically and internationally. Of particular importance is whether a domestic corporate tax can affect the allocation of capital and labor in a foreign country, and the proportion of the domestic corporate tax burden borne by foreign workers and holders of foreign capital. This point has received little attention in the literature, and only becomes more salient as economies become increasingly interrelated. In addition, future research should continue to pay particular attention to the effect of the corporate tax on landowners and the measure of excess burden generated by the tax relative to other forms of taxation.

Future research will continue to shed light on the effects of the corporate income tax. As evidenced by the critiques of recent empirical work, studying the effects of the corporate tax is a challenging endeavor. However, this paper shows that regardless of the proportion of the corporate tax borne by capital and labor, the corporate income tax remains a generally progressive aspect of the tax code.

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Table 1
Estimates of the Corporate Tax Burden (CTB) from Recent Studies

Study	Methodology	Results
<i>Simulations</i>		
Randolph (2008)	Two-country, multi-sector general equilibrium model. Simulation assumes capital is perfectly mobile across borders and internationally tradable goods are perfect substitutes.	Baseline specification shows labor bears 73.7 percent of the CTB. Alternate assumptions show labor bearing between 59.0 and 90.6 percent of the CTB.
Gravelle and Smetters (2006)	Two-country, multi-sector general equilibrium model. Central aim of paper is to show CTB when foreign and domestic goods are not perfect substitutes.	Capital bears between 71 and 91 percent of the CTB when domestic-foreign product substitution elasticity is 1. If elasticity is high (goods are perfect substitutes) and portfolio elasticity is high, labor bears 71 percent of the CTB.
<i>Empirical studies</i>		
Hassett and Mathur (2006)	Empirical study that uses international country-level panel data for 72 countries across 25 years. Measures the impact of CT on manufacturing wages by regressing various measures of the CT on average 5 year average wage rate.	Elasticity of wages with respect to top CT rate is -0.85. Other measures of corporate tax—effective average and effective marginal tax rate—show that the elasticity is closer to -0.50.
Desai, Foley, and Hines (2007)	Empirical study that uses multinational firm-level data to show effect of CT on wages. Paper uses a panel data set of firms across 25 years and 50 countries. The sum of the CTB shared by capital and labor is restricted to 1.	Labor bears between 45 percent and 75 percent of the CTB. The baseline finding is that labor bears 57 percent of the CTB.
Arulampalam, Devereaux, and Maffini (2009)	Empirical study that uses panel data in 55,000 European firms from 1993 to 2003 to measure effect of corporate taxes paid on employee wages. Measures the CT's impact on the wage bargain over economic rents.	Long-run elasticity of wages with respect to corporate taxes paid is -0.093 in preferred specification, equivalent to 75 percent burden falling on wages. Labor bears close to all of the incidence in the short-run.

Table 2
Mean Capital Income by Wage Level, 2012

Wage Level	Capital Gains	Dividends	Interest	Subtotal: non-retirement capital income	Retirement account capital income	All capital income
Less than 10	3,942	4,230	3,137	11,309	2,540	13,849
10-20	972	823	694	2,489	573	3,062
20-30	882	655	515	2,052	740	2,792
30-40	907	645	501	2,053	1,181	3,234
40-50	1,249	850	610	2,709	1,714	4,423
50-75	1,449	1,128	834	3,412	2,988	6,400
75-100	1,952	1,381	1,132	4,464	5,109	9,573
100-200	4,376	2,979	2,219	9,573	11,311	20,884
200-500	28,275	16,279	10,306	54,860	29,522	84,382
500-1,000	103,669	62,477	35,750	201,896	62,050	263,946
More than 1,000	535,853	299,131	160,960	995,945	179,727	1,175,672
All	3,518	2,872	2,052	8,442	3,639	12,081

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

Table 3
Average Effective Tax Rates by Corporate Tax Incidence Assumption
Baseline Simulation

α = proportion of corporate tax incidence falling on capital

Cash Income Percentile	Incidence falls primarily on capital ($\alpha=0.8$)		Incidence is split between capital and labor ($\alpha= 0.5$)		Incidence falls primarily on labor ($\alpha=0.2$)	
	Corporate Income Tax	All Federal Tax	Corporate Income Tax	All Federal Tax	Corporate Income Tax	All Federal Tax
Lowest Quintile	1.1	4.8	1.6	5.3	2.2	5.9
Second Quintile	1.3	10.6	2.0	11.2	2.6	11.9
Middle Quintile	1.3	16.7	2.1	17.4	2.9	18.2
Fourth Quintile	1.5	19.5	2.2	20.2	2.9	20.9
Top Quintile	4.0	24.6	3.4	24.0	2.8	23.4
All	2.8	20.7	2.8	20.7	2.8	20.7
Addendum						
80-90	1.8	22.0	2.4	22.6	3.0	23.2
90-95	2.2	23.1	2.6	23.4	2.9	23.8
95-99	3.3	24.6	3.0	24.3	2.7	24.0
Top 1 Percent	7.0	27.2	4.9	25.1	2.8	23.0
Top 0.1 Percent	9.2	29.1	6.1	26.0	3.1	23.0

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

Notes: Tax units with negative cash income are excluded from the lowest income class but are included in the totals. For a description of cash income, see <http://www.taxpolicycenter.org/TaxModel/income.cfm>. Estimates include both filing and non-filing units but exclude those that are dependents of other tax units. Simulations are for calendar year 2012.

Table 4
Average Effective Tax Rates by Corporate Tax Incidence Assumption
Capital Share Includes Retirement Account Capital

α = proportion of corporate tax incidence falling on capital

Cash Income Percentile	Incidence falls primarily on capital ($\alpha=0.8$)		Incidence is split between capital and labor ($\alpha=0.5$)		Incidence falls primarily on labor ($\alpha=0.2$)	
	Corporate Income Tax	All Federal Tax	Corporate Income Tax	All Federal Tax	Corporate Income Tax	All Federal Tax
Lowest Quintile	1.3	5.0	1.7	5.5	2.2	5.9
Second Quintile	1.4	10.6	2.0	11.3	2.6	11.9
Middle Quintile	1.6	16.9	2.2	17.5	2.9	18.2
Fourth Quintile	1.8	19.8	2.4	20.4	3.0	21.0
Top Quintile	3.8	24.3	3.3	23.8	2.8	23.3
All	2.8	20.6	2.8	20.6	2.8	20.6
Addendum						
80-90	2.3	22.3	2.7	22.7	3.1	23.2
90-95	2.8	23.5	2.9	23.7	3.0	23.8
95-99	3.5	24.7	3.1	24.3	2.8	24.0
Top 1 Percent	5.6	25.8	4.0	24.3	2.4	22.7
Top 0.1 Percent	7.0	26.9	4.8	24.7	2.5	22.4

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

Notes: Tax units with negative cash income are excluded from the lowest income class but are included in the totals. For a description of cash income, see <http://www.taxpolicycenter.org/TaxModel/income.cfm>. Estimates include both filing and non-filing units but exclude those that are dependents of other tax units. Simulations are for calendar year 2012.

Table 5
Average Effective Tax Rates by Corporate Tax Incidence Assumption
Corporate Tax Receipts Doubled

α = proportion of corporate tax incidence falling on capital

Cash Income Percentile	Incidence falls primarily on capital ($\alpha=0.8$)		Incidence is split between capital and labor ($\alpha= 0.5$)		Incidence falls primarily on labor ($\alpha=0.2$)	
	Corporate Income Tax	All Federal Tax	Corporate Income Tax	All Federal Tax	Corporate Income Tax	All Federal Tax
Lowest Quintile	2.2	5.9	3.3	7.0	4.3	8.0
Second Quintile	2.6	11.9	3.9	13.2	5.2	14.5
Middle Quintile	2.7	18.0	4.2	19.5	5.7	21.1
Fourth Quintile	3.0	21.0	4.4	22.4	5.8	23.8
Top Quintile	7.9	28.5	6.8	27.4	5.7	26.3
All	5.6	23.5	5.6	23.5	5.7	23.5
Addendum						
80-90	3.6	23.8	4.8	25.0	6.0	26.2
90-95	4.4	25.3	5.1	26.0	5.8	26.7
95-99	6.6	27.9	6.0	27.3	5.4	26.7
Top 1 Percent	14.0	34.2	9.8	30.0	5.6	25.8
Top 0.1 Percent	18.4	38.3	12.3	32.2	6.2	26.1

Source: Urban-Brookings Tax Policy Center Microsimulation Model.

Notes: Tax units with negative cash income are excluded from the lowest income class but are included in the totals. For a description of cash income, see <http://www.taxpolicycenter.org/TaxModel/income.cfm>. Estimates include both filing and non-filing units but exclude those that are dependents of other tax units. Simulations are for calendar year 2012.

Appendix Table 1
Median Income by Wage Level, 2012

Wage Level	Capital Gains	Dividends	Interest	Retirement account capital income	All capital income
Less than 10	0	0	0	420	642
10-20	0	0	0	62	70
20-30	0	0	0	161	176
30-40	0	0	0	464	497
40-50	0	0	0	705	793
50-75	0	0	0	1,481	1,658
75-100	0	0	39	2,950	3,345
100-200	0	0	114	6,792	7,985
200-500	0	715	555	18,593	24,814
500-1,000	0	7,202	2,594	39,134	73,048
More than 1,000	0	30,946	10,910	77,081	198,067
All	0	0	0	663	890

Source: Urban-Brookings Tax Policy Center Microsimulation Model.