WHO PAYS THE CORPORATE TAX IN A GLOBAL ECONOMY?

Kimberly A. Clausing

The theory of corporate tax incidence suggests that corporate taxes are more likely to harm labor in a globally integrated economy. However, a review of the prior empirical work in this area fails to reveal persuasive empirical evidence of adverse effects on labor, since these studies have several weaknesses that interfere with robust inferences. Using new data and methods, this paper provides additional evidence on the incidence of corporate taxation, finding no robust link between corporate taxation and wages. I discuss possible explanations for these findings as well as policy implications.

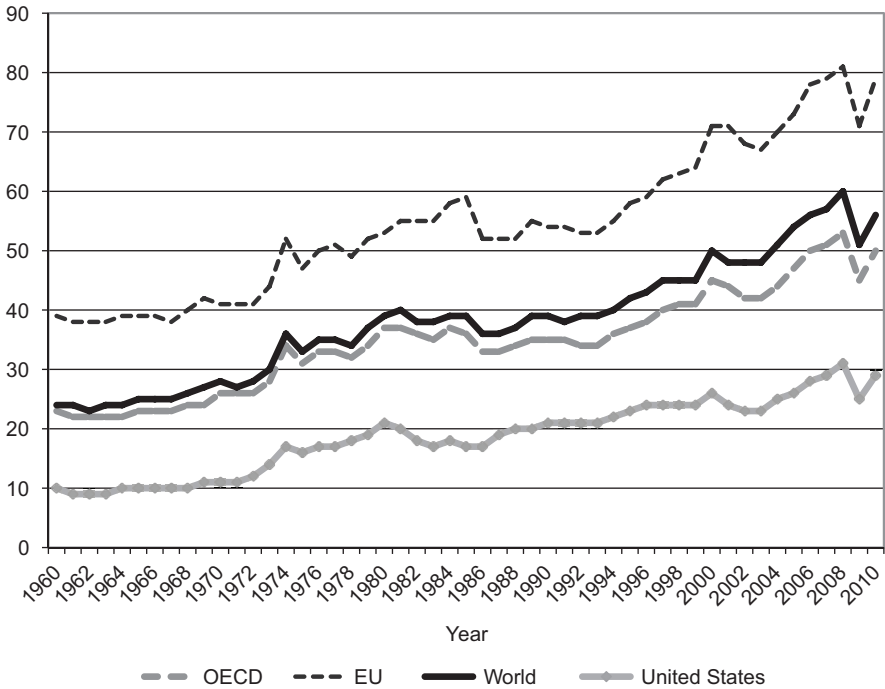*Keywords: corporate taxation, tax incidence, tax competition, international taxation*

JEL Codes: H25, H22, H87

I. INTRODUCTION

By almost any measure, the world economy has become more globally integrated over the previous decades. Figures 1 and 2 illustrate two measures of such integration, ratios of international trade to GDP and ratios of foreign direct investment flows to GDP, both of which show dramatic increases in cross-border economic activity. This burgeoning economic integration has important implications for the incidence of the corporate tax. Since the canonical model of Harberger (1962), economists have understood the general equilibrium nature of the corporate tax, which falls not just on capital in the corporate sector, but also affects the size of sectors of production and the overall return to capital in the economy as a whole. Harberger (1995, 2008), Randolph (2006), and Gravelle and Smetters (2006) extend this model to a more global economy, finding that the incidence of the corporate tax is likely to fall, at least in part, on labor.

However, the share of the corporate tax burden that falls on labor depends on a number of uncertain economic parameters as well as other considerations outside of these models. Thus, to a large extent, the question is an empirical one. Recent research has considered this question, but the prior analyses have been subject to critical flaws. In
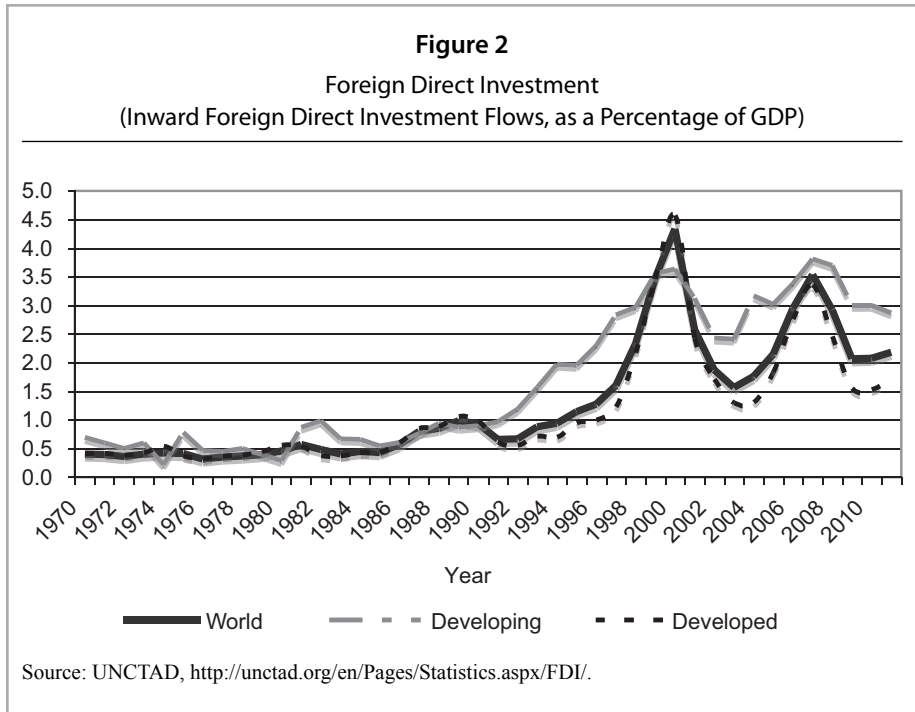
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Figure 1

Trade to GDP Ratios
(Exports and Imports as a Percentage of GDP)

Source: World Bank's *World Development Indicators*, http://databank.worldbank.org/ddp/home.
do?Step=12&id=4&CNO=2.

particular, this work often ignores the general equilibrium tax incidence mechanism entirely, and when this mechanism is addressed, the results are not robust to relatively minor changes in specification.

   After reviewing these contributions, this paper undertakes new analyses of the corporate tax incidence question, using more comprehensive data and new methods. I fail to uncover a systematic relationship between corporate taxation and wages in Organisation for Economic Co-operation and Development (OECD) countries over the period 1981–2009. I then discuss several possible explanations for this non-finding. It is possible that the data are insufficient to identify the true effect of corporate taxation on wages, or that the mechanism through which labor may be harmed has more to do with rent sharing than with capital reallocation. But it is also possible that capital bears

Figure 2

Foreign Direct Investment

(Inward Foreign Direct Investment Flows, as a Percentage of GDP)

Source: UNCTAD, http://unctad.org/en/Pages/Statistics.aspx/FDI/.

the tax due to considerations omitted from the main open-economy general equilibrium model. Further, clientele effects and international tax avoidance suggest two channels whereby labor might escape harmful effects from high corporate tax rates.

Finally, informed by the analysis of the paper, I discuss corporate tax policy issues confronting the United States and other countries. The corporate tax still has an important role to play in raising revenue, in protecting the individual income tax system, and in generating a more progressive tax system. Rate-lowering and base-broadening reforms can help address distortions introduced by the corporate tax, and it may make practical sense to shift some capital taxation away from the corporate level of taxation and toward the individual level of taxation. Finally, improvements in the international dimensions of corporate tax policy are long overdue.

II. PRIOR WORK ON CORPORATE TAX INCIDENCE

Unfortunately, the general equilibrium theory of corporate tax incidence does not by itself resolve the relative burden of the corporate tax, but it does clearly explicate the theoretical mechanism that may cause the corporate income tax to affect workers.[1] In a

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[1] A far more extensive literature review is provided in Clausing (2012).

global economy, capital moves from high-tax locations to low-tax locations in response to corporate tax rate differentials. This raises the marginal product of labor and increases wages in low-tax countries, and it lowers the marginal product of labor and decreases wages in high-tax countries. Thus, the corporate tax can be expected to fall, at least in part, on labor in the high-tax countries.

As Gravelle (2013) points out, however, these conclusions depend on a number of key economic parameters that are difficult to determine, including the degree of capital mobility, international product substitution elasticities, the relative capital intensity of the corporate sector, the size of the country, and the degree of factor substitution. Beyond these uncertainties, the models underlying these conclusions also neglect many important real-world features of the corporate tax such as residence-based elements, accelerated depreciation rules, and the deductibility of debt, which may result in implicit subsidization of debt-financed investments. Dynamic considerations, imperfect competition, the role of bargaining, and policy interactions with other countries' policies are also ignored.

Thus, determining the true incidence of the corporate tax requires an empirical investigation; several recent papers have attempted just such analyses. I will group these contributions into two types: those that directly engage the open-economy general equilibrium corporate tax incidence models and those that do not.

There are remarkably few papers that directly engage the open-economy general equilibrium tax incidence mechanism, but (with some caveats) I would include Hassett and Mathur (2010), Felix (2007), and Desai, Foley, and Hines (2007). All three of these papers find that corporate taxation has large negative effects on wages, but all three of these papers also have key limitations and are sensitive to idiosyncratic specification and data choices.

Hassett and Mathur (2010) use a cross-country data set of 65 countries over the period 1981 to 2005, relating five-year average wages to the corporate tax rate as well as several control variables, one of which is worker value-added. This control variable confounds estimation of the open-economy general equilibrium mechanism, since corporate taxes are hypothesized to affect capital stocks across countries, and thus the value-added of workers. Once the later is controlled for, it is not entirely clear that corporate taxes should have an independent effect on wages. Nonetheless, Hassett and Mathur (2010) find large effects, which Gravelle and Hungerford (2011) note are implausibly large, since they imply a \$1 increase in corporate tax revenue would reduce wages by \$22. They also note that the findings are not robust to specification choices such as the use of a five-year average wage and the (lack of) inflation and purchasing power parity (PPP) exchange rate adjustments.

Felix (2007) takes a similar approach, but employs household survey data for wage measurements, examining data from 30 countries over the period 1979 to 2002. As Felix notes, many results indicate statistically insignificant tax effects, but the main statistically significant effects come in specifications that include openness interaction terms. Oddly, in these specifications, it is the closed countries that experience negative wage effects from high corporate taxes, a result that is counterintuitive given that the general equilibrium tax incidence result comes from the mobility of capital across countries.

Finally, Desai, Foley, and Hines (2007) estimate wage and interest rate sensitivity to corporate taxes for a four year sample (1989, 1994, 1999, and 2004) of U.S. multinational firm affiliates in OECD countries. They focus on the relative burden of the tax, explicitly constraining the tax burden shares to sum to one. Whether such a sample can test general-equilibrium effects is questionable, since U.S. multinational firm affiliate firms comprise just one small subset of wage outcomes in any particular country, and interest rate payments are not a good measure of returns to capital, particularly since they may be sensitive to tax-motivated financial decisions concerning sources of affiliate finance. Also, Gravelle and Hungerford (2011) note that the results are sensitive to specification choices and become statistically insignificant if the tax burden share constraint is relaxed.

A second set of papers investigates corporate tax incidence, but these papers do not focus on the open-economy general equilibrium tax incidence mechanism. These papers include Arulampalam, Devereux, and Maffini (2010), Liu and Altshuler (2013), and Carroll (2009). Arulampalam, Devereux, and Maffini (2010) use firm level data, Liu and Altshuler (2013) use industry level data and Carroll (2009) uses data from U.S. states. In all cases, these analyses would not capture the effects predicted by general equilibrium tax incidence theory, since the effects of the corporate tax should be felt by all workers and capital owners in an economy, not just those in particular firms, industries, or states. Indeed, Arulampalam, Devereux, and Maffini (2010) and Liu and Altshuler (2013) focus explicitly on a rent-sharing mechanism.

Note that reported results are sensitive to key assumptions. In Arulampalam, Devereux, and Maffini (2010), results vary a great deal across specification choices and the lag structure choice is also important, as noted by Gravelle and Hungerford (2011). Carroll (2009) notes that reported tax effects are not always robust to alternate specification choices, and results using conventional marginal tax rates are not typically statistically significant at the 95 percent confidence benchmark.

Further, the policy implications from these studies are unclear. In Liu and Altshuler (2013), for example, results are considered contemporaneously, allowing no time for workers to move between industries. Even if some lags are included, as in Arulampalam, Devereux, and Maffini (2010), it is unlikely that we are learning much about the economy-wide incidence of the corporate tax from these types of studies. If these studies are capturing a division of rents rather than equilibrium changes in returns to capital and labor, their implications for the efficiency effects of the corporate tax are unclear. Indeed, a tax on rents need not affect relative factor use — decisions about capital and labor that maximize before-tax economic profits also maximize after-tax economic profits. Whatever rents are shared with workers may be dissipated throughout the economy as labor moves across firms and industries.

Thus, while the general equilibrium tax theory predicts that labor will bear a substantial portion of the corporate tax burden in an open economy, prior empirical work has not shed light on the crucial economic mechanisms at hand. Some papers focus on distinct economic mechanisms, such as rent sharing, and they do not consider economy-wide effects of corporate tax policy on wages and returns to capital. Other papers focus on

cross-country data, but they either find ambiguous results, or they suffer from critical data or methodological limitations.
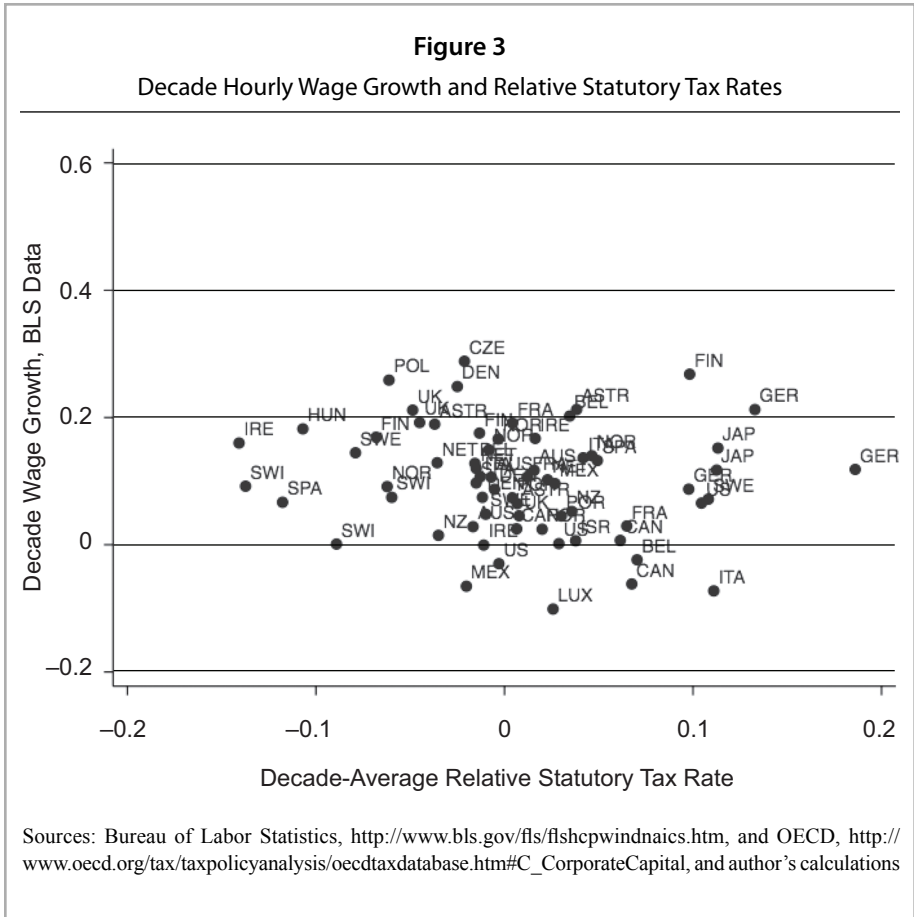
III. EVIDENCE ON COPORATE TAX INCIDENCE

The present analysis hopes to improve on the previous literature in three respects. First, it will solely use a cross-country analysis, focusing on the open-economy general equilibrium theoretical mechanisms implied by theory. These mechanisms make the clear prediction that high-tax countries should have a lower capital stock than low-tax countries, all else equal, and these changes in world capital allocation should affect the marginal product of labor and the resulting wages in each country, lowering wages in high-tax countries and raising wages in low-tax countries. Second, the present analysis will use additional sources of data on both labor market outcomes and corporate tax policy variables, focusing on the OECD countries due to their comparable levels of economic development and their more uniform data. Third, in all cases, extensive sensitivity analyses will be performed.

Both the data and the analysis are described in more detail in Clausing (2012); the present paper summarizes key sections of that analysis as well as providing some additional evidence. While the prior analysis examined four sources of cross-country wage data and four corporate tax policy variables, the present analysis will focus on two wage series and two tax variable series. The earlier analysis attempted to be as comprehensive as possible, using every relevant available data series, while the present analysis focuses solely on those series that are of the highest quality. For the wage data, I rely on the U. S. Bureau of Labor Statistics (BLS) international production worker hourly wage series and the OECD annual worker wage series. For the tax policy data, I use a combined statutory tax rate from the OECD and an effective tax rate series calculated from U.S. Bureau of Economic Analysis data. The selection of these series, issues of data definitions and comparability, and the underlying advantages and disadvantages of the particular series are all discussed in an appendix available from the author.

Before examining more sophisticated multiple regression analyses, it is useful to begin with some basic illustrations of the recent OECD experience in corporate taxation and labor market outcomes. Indeed, the previous time period has been filled with policy experimentation, as many countries lowered their corporate tax rates during this period, although countries varied substantially in both the timing and extent of these changes. For example, over the time period analyzed (1981 to 2009), about 55 percent of the observations indicate a statutory tax rate change for that country within the previous five years.
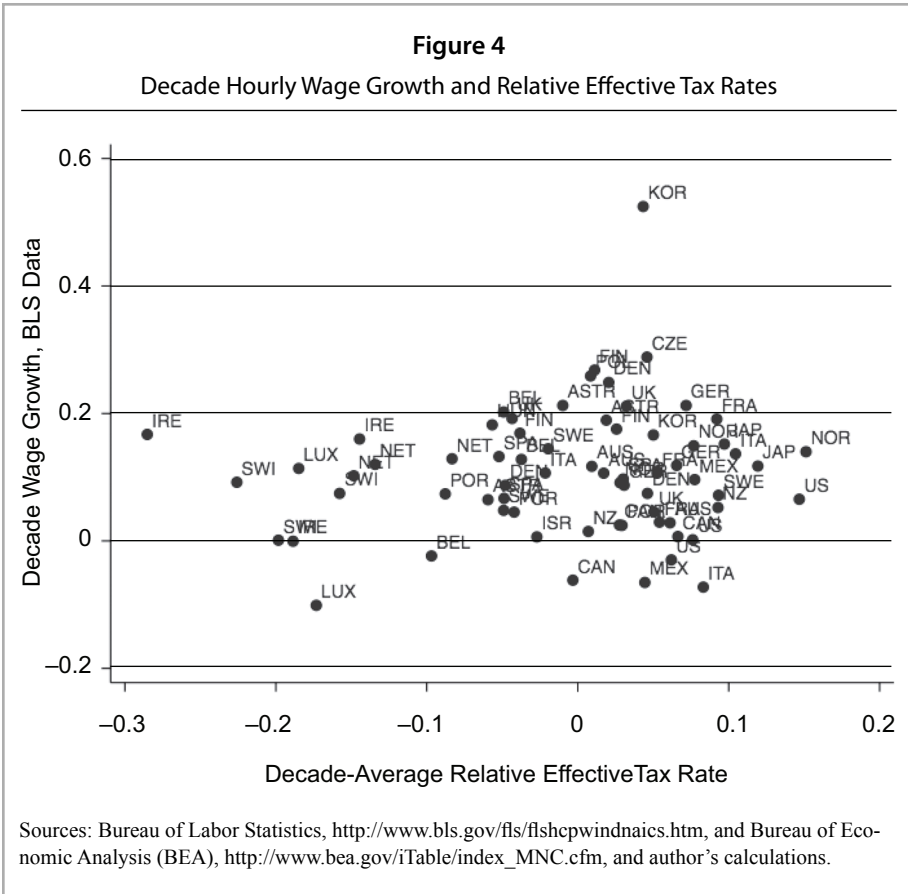
Figures 3 and 4 show scatter plots examining simple correlations between the BLS data hourly wage growth over three decades (the 1980s, 1990s, and 2000s) and the corresponding relative corporate income tax rates. Figure 3 shows the average relative statutory tax rate of each country in comparison to the rest of the countries in the sample over the same decade. Figure 4 is identical except it considers decade-long averages of the relative effective tax rate. In both cases, the figures do not show clear empirical

Figure 3

Decade Hourly Wage Growth and Relative Statutory Tax Rates

Sources: Bureau of Labor Statistics, http://www.bls.gov/fls/flshcpwindnaics.htm, and OECD, http://www.oecd.org/tax/taxpolicyanalysis/oecdtaxdatabase.htm#C_CorporateCapital, and author's calculations

relationships between wage growth and average relative tax rates over the three most recent decades.

Figures 5 and 6 show the same types of simple scatter plots; the only difference is that the use of the OECD annual wage data, which constrains the sample to two decade averages, the 1990s and the 2000s. While there seems to be some evidence of a negative relationship between annual wage growth over these two decades and decade-average relative statutory tax rates in Figure 5, that relationship is less apparent in Figure 6, which shows relative effective tax rates. The correlations between the variables in Figures 3, 4, 5, and 6 are –0.07, +0.07, –0.47, and –0.09. The largest coefficient implies that about 22 percent of the variation in wage growth is explained by variation in relative tax rate; the other three coefficients imply that the variables are not well correlated.

Individual country level evidence also indicates little systematic relationship between changes in corporate tax rates and subsequent wage growth. In figures available from

Figure 4

Decade Hourly Wage Growth and Relative Effective Tax Rates

Sources: Bureau of Labor Statistics, http://www.bls.gov/fls/flshcpwindnaics.htm, and Bureau of Economic Analysis (BEA), http://www.bea.gov/iTable/index_MNC.cfm, and author's calculations.

the author, I consider the full experience of all OECD countries that have experienced large statutory rate decreases.[2]

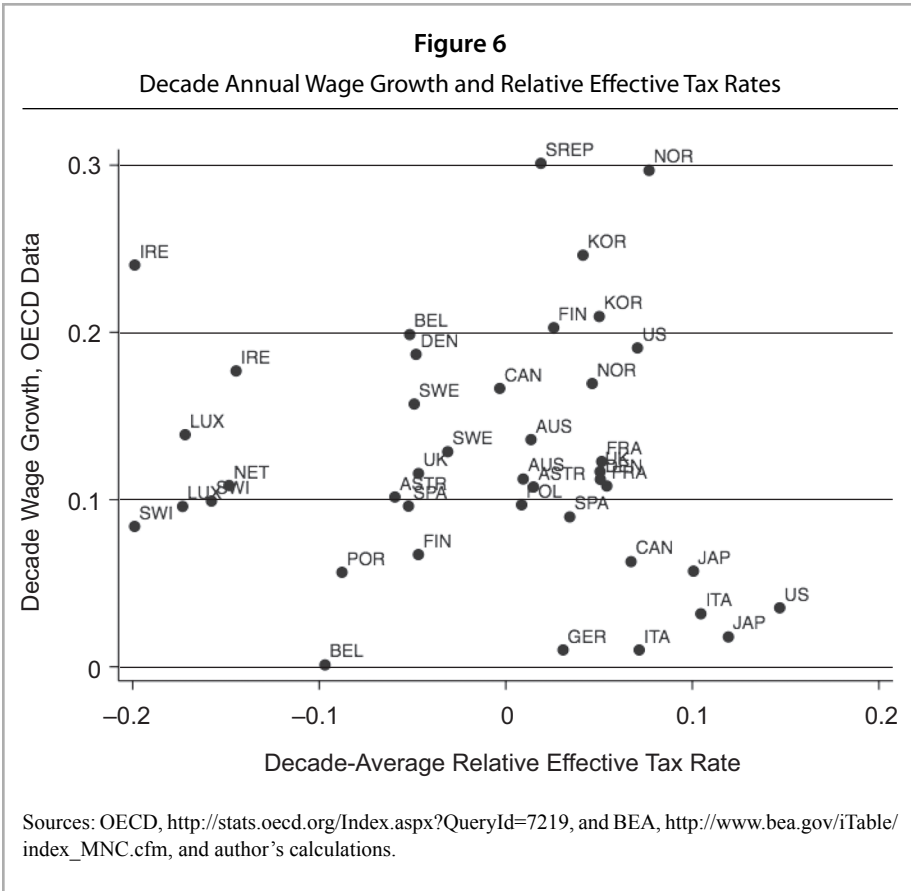## A. Regressions Modeling the Open Economy Corporate Tax Incidence Mechanism

Moving beyond simple illustrations, the following multiple regressions analysis proceeds by separating the corporate tax incidence question into two parts. First, is

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[2] These figures show the country experience for the sixteen OECD countries that have experienced large statutory tax rate declines and that have adequate data coverage for both the combined statutory corporate tax rate and the BLS hourly production worker wage. There are only a few countries (Australia and possibly France and Italy) where large corporate tax decreases appear to be associated with positive changes in the pace of wage growth. Typically, the time series evidence of these links is far from transparent.

Figure 5

Decade Annual Wage Growth and Relative Statutory Tax Rate
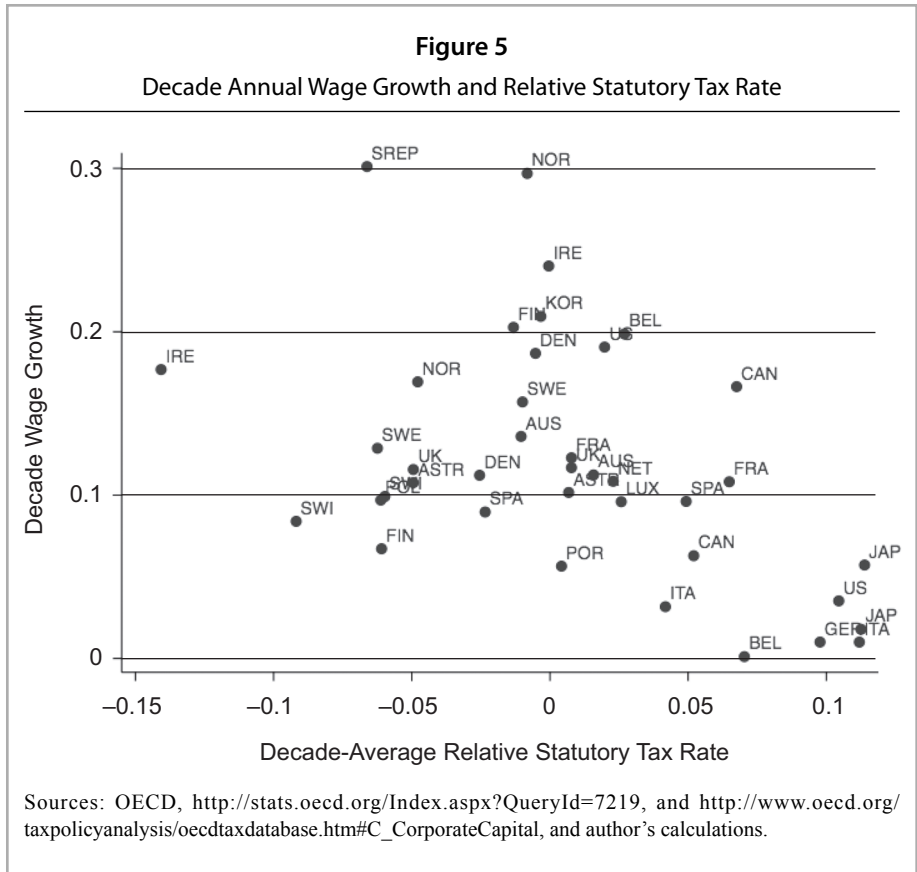
there a relation between corporate tax rate variables and capital investment? Second, is there a relationship between labor market outcomes and capital investment? If the economic mechanisms driving the open-economy general equilibrium models of corporate tax incidence are at work, both questions should be answered affirmatively. Higher corporate taxes should be associated with lower levels of investment, and the lower capital-to-labor ratio should correspond with adverse labor market outcomes. For low-tax countries, the opposite outcomes are expected, with higher investment levels and better labor market outcomes.

   The simple illustrations above may not illuminate the true effect of corporate tax influences since other important influences are also acting on wages and investment, and these influences may confound the interpretation of raw correlations. For example, macroeconomic factors likely have a large influence on investment. In addition, different countries may have different base-levels of investment relative to GDP due to the nature of their economies, their stage of development, and long term institutional,

Figure 6

Decade Annual Wage Growth and Relative Effective Tax Rates

Sources: OECD, http://stats.oecd.org/Index.aspx?QueryId=7219, and BEA, http://www.bea.gov/iTable/
index_MNC.cfm, and author's calculations.

cultural, or other country-specific factors. There may also be time specific influences that are associated with economic shocks, trends, or other events.

The specifications reported in Table 1 model how all of these influences affect investment. The dependent variable is the ratio of gross fixed capital formation to GDP. The regressions consider the impact of corporate tax variables, considering the average of the most recent six years (the current year and the five previous years) of relative tax rates in comparison to the average of OECD countries. This choice is admittedly ad hoc, but it allows for some time lag between corporate tax policy changes and their effects on investment. The use of relative rates considers the country tax rate values in comparison to the mean value of OECD countries for that particular year. Thus, if a country had an average relative tax rate of –0.05, that would imply that over the six most recent years of data, the tax rate averaged a value that was 5 percentage points lower than that of other countries in the same years. Again, I use two measures of the tax rate — the statutory combined rate of central and sub-central layers of government and the effective tax rate calculated from BEA data.

Table 1

Regressions Explaining Gross Fixed Capital Formation/GDP

	(1)	(2)
Growth of	0.0844*	0.0722
real GDP	(0.0389)	(0.0403)
Unemployment rate	−0.647***	−0.706***
	(0.0338)	(0.0356)
6 year relative tax	0.0451**	
(Statutory combined)	(0.0166)	
6 year relative tax		0.00516
(Effective tax rate)		(0.0164)
Constant	0.272***	0.276***
	(0.00463)	(0.00447)
Fixed effects?	yes	yes
Time effects?	yes	yes
N	546	518
R^2	0.58	0.55

Notes: Standard errors in parentheses. Asterisks denote significance at the 0.1% (***), 1% (**), and 5% (*) levels.

The specifications control for the growth of real GDP from the prior year and the unemployment rate, both proxies for the state of the macroeconomy. In addition, there are both country-specific and time-specific fixed effects, to consider the influence of the factors described above. Columns (1) and (2) differ only by considering the influence of the different tax rates.

In these regressions, both time and country-specific effects are highly jointly statistically significant. As expected, the growth rate typically has a statistically significant positive coefficient (though only with 92 percent confidence in one case) whereas the unemployment rate has a highly statistically significant negative coefficient. Surprisingly, the only statistically significant tax coefficient is positive, in the case of the average relative statutory combined tax rate. This is a puzzling finding, and I consider several alternative specifications. For example, I consider the specification in changes, considering how changes in the gross fixed capital formation to GDP ratio were related to changes in the growth rate, changes in the unemployment rate, and a five-year change in the relative tax rate. I also consider tax variables in levels rather than in relative terms. Neither alternative changed the above conclusions.

Since the corporate tax incidence mechanism is driven by a relationship between corporate taxation and the capital stocks that workers have at their disposal, it is also useful to examine the relationship between corporate tax variables and capital-to-labor

ratios. Table 2 examines specifications that consider how capital-to-labor ratios depend on corporate tax variables, controlling for the real PPP-adjusted GDP per-capita of countries (in order to account for the fact that capital-to-labor ratios tend to be higher in higher income countries), country- fixed effects, and time-fixed effects. Again, columns (1) and (2) differ only by considering the influence of the different tax rates examined above. In both cases, the tax coefficients are statistically indistinguishable from zero. Thus, there is only very limited evidence in favor of the open-economy general equilibrium corporate tax incidence mechanism.

The second stage of the analysis considers the relationship between investment and labor market outcomes. Economic theory has long established a relationship between these two variables, based on the premise that countries with a higher capital stock benefit from higher worker productivity and thus higher wages. Indeed there is a large body of empirical data that verifies that workers in more capital abundant countries earn higher wages.[3] Table 3 shows a simple series of regressions explaining wages, using

Table 2

Regressions Explaining Ln (K/L)

	(1)	(2)
GDP per-capita	0.0321	–0.0295
	(0.0342)	(0.0389)
6 year relative tax (Statutory combined)	0.00980	
	(0.0818)	
6 year relative tax (Effective tax rate)		0.102
		(0.0832)
Constant	10.84***	11.36***
	(0.333)	(0.373)
Fixed effects?	yes	yes
Time effects?	yes	yes
N	601	582
R^2	0.76	0.75

Notes: Standard errors are in parentheses. Asterisks denote significance at the 0.1% (***), 1% (**), and 5% (*) levels.

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[3] While economic growth theory makes the clear prediction that more capital abundant countries should have higher labor productivity and higher wages, international trade theory predicts factor price equalization (and thus equal wages) between all countries. Factor price equalization holds with diversified production, common technology, and free trade in goods. Still, trade economists have long noted that this prediction is spectacularly refuted by the data. When one allows for factor augmenting technical differences between countries, the theory performs somewhat better.

Table 3

Regressions Explaining Ln (Wages)

	(1) BLS Hourly Wage	(2) OECD Annual Wage
Average years schooling	0.0398*** (0.00609)	−0.00561 (0.00489)
Recent years K/L ratio	0.562*** (0.0394)	0.251*** (0.0343)
Last 5 years labor force growth	−0.504*** (0.105)	0.0523 (0.0746)
Last 5 years GDP growth	0.152* (0.0712)	0.276*** (0.0481)
Unemployment	−0.117 (0.185)	0.338* (0.136)
Time effects country effects	yes yes	yes yes
N	542	435
R^2	0.71	0.78

Notes: All dependent variables are in natural logarithmic terms. Standard errors are in parentheses. Asterisks denote significance at the 0.1% (***), 1% (**), and 5% (*) levels.

both the BLS data on hourly production worker wages and the OECD data on average annual wages. Wages are related to the average years of schooling for the population age 25 years and above, recent capital stock to labor force ratios (the average of the current and previous five years), the growth rate of the labor force over the previous five years, the growth rate of the economy over the previous five years, and the current unemployment rate. The specifications include country and year effects; these are always highly jointly statistically significant. While this is an ad hoc specification, other choices were also considered.

In most cases, results conform to expectations; it is expected that a lower unemployment rate, lower labor force growth, higher economic growth, higher capital-to-labor ratios, and higher levels of schooling will increase wages. Most of the statistically significant coefficient signs are as expected, although there is an anomalous finding for the relation between unemployment and annual wages in column (2). The capital-to-labor terms have a positive sign and are statistically significant with greater than 99 percent confidence.

In theory, there is no clear rationale for including corporate tax terms in specifications such as those shown in Table 3. If corporate taxes affect wages by affecting investment and the subsequent capital stocks that workers utilize, then the effect of corporate taxation on wages is indirect, and it should be captured by capital investment terms. An effect on the wage rate above and beyond the effect on investment could capture other mechanisms, such as rent sharing between owners and workers, but these are not the mechanisms at work in general equilibrium tax incidence models. Of course, such effects could also be due to omitted variables or spurious correlations.

Nonetheless, I also consider these wage specifications with the two tax terms included: the average value over recent years of (1) the relative statutory combined tax rate and (2) the relative effective tax rate. In the case of the statutory combined rate, the tax coefficients are statistically negative, and in the case of the effective tax rate, the tax coefficients are statistically positive. If these same specifications are considered with the tax terms, but omitting the capital-to-labor terms so that the tax terms also capture the effects of investment reductions, the tax coefficient results are statistically equivalent, indicating little evidence of the general equilibrium incidence mechanism at work.

Thus, some of the results above appear to support the hypothesis that higher corporate tax rates lower wages. But the complete body of evidence casts doubt on this hypothesis, and there is no evidence in support of the main channel of causality in open-economy general equilibrium corporate tax incidence models.

B. A Vector Autoregression Analysis

In many respects, the above analyses are unsatisfying. It is difficult to know the ideal specifications to employ, results are sensitive to choices regarding which data on wages and tax rates are used, and the specifications are rife with endogeneity concerns. Indeed, wages and investment could easily influence some of the right hand side variables, and one can imagine other factors that would affect both dependent and independent variables. In this section, I consider an alternative way of approaching these questions, a vector autoregression model.

In a vector autoregression (VAR) model, a system of equations is estimated, where each variable is specified to depend on its own lagged values and lagged values of the remaining variables. In such models, the distinction between exogenous and endogenous variables becomes moot, as the method simply considers how a group of variables evolves based on their own previous values. Only lagged values of variables are included on the right hand side.

There are some essential advantages to these methods. Given that the true underlying causal relationships are at times ambiguous, results from these equations may help determine whether causal relationships exist. In particular, if past values of one variable x are found to be a statistically significant influence on a different variable y even in the presence of the past values of such a variable y, that is often taken as evidence that there may be a causal relationship between the two variables.[4] Non-causality is simi-

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[4] Still, there remains the possibility that a third omitted influence could be an important causal factor driving both x and y.

larly implied if the past values of x, considered jointly, are not a statistically significant influence on y in the presence of past values of y.

I consider a system of equations that includes the following:

$$(1) \quad Wage_{it} = \sum_i \alpha_i + \sum_{n=1}^{5} Wage_{i,t-n} + \sum_{n=1}^{5} Tax_{i,t-n} + \sum_{n=1}^{5} K/L\ Ratio_{i,t-n} + \sum_{n=1}^{5} GDP_{i,t-n}$$

$$+ \sum_{n=1}^{5} Unem_{i,t-n} + \sum_{i=1}^{x} \alpha_i$$

$$K/L\ Ratio_{it} = \sum_i \alpha_i + \sum_{n=1}^{5} K/L\ Ratio_{i,t-n} + \sum_{n=1}^{5} Tax_{i,t-n} + \sum_{n=1}^{5} Wage_{i,t-n}$$

$$+ \sum_{n=1}^{5} GDP_{i,t-n} + \sum_{n=1}^{5} Unem_{i,t-n} + \sum_{i=1}^{x} \alpha_i$$

$$Tax_{it} = \sum_i \alpha_i + \sum_{n=1}^{5} Tax_{i,t-n} + \sum_{n=1}^{5} Wage_{i,t-n} + \sum_{n=1}^{5} K/L\ Ratio_{i,t-n} + \sum_{n=1}^{5} GDP_{i,t-n}$$

$$+ \sum_{n=1}^{5} Unem_{i,t-n} + \sum_{i=1}^{x} \alpha_i$$

In this model, the included variables are measures of wages, corporate tax rates, capital-labor ratios, real GDP, and unemployment rates; all specifications include country fixed effects.[5] Investigating this system of regressions, one is not presuming that any particular endogenous variable is determined by a set of exogenous variables. Instead, one is considering whether past values of variables on the right-hand side influence current values of the variables on the left-hand side, controlling for the past values of the left-hand side variables.

Yet it should be noted that a VAR approach is not without disadvantages. VAR systems of equations are often not robust to changes in the number of lags, the frequency of the data, or the inclusion of additional variables. Therefore, I perform many robustness checks below.[6]

Since the individual regressors are typically highly collinear, individual t statistics are unreliable, so the influence of variables on the right-hand side is considered by performing F tests of the joint statistical significance of the group of regressors. Thus, to ascertain the possible influence of corporate taxes on wages, one would examine whether past values of corporate tax values as a group had a statistically significant impact on wage levels, controlling for past wage levels and the other variables in the model.

Four VAR models are estimated to consider the two different sources of wage data and the two different possible corporate tax variables.[7] Table 4 reports the F statistics

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[5] I discuss alternative specifications below. They are not reported here but are available upon request from the author.

[6] VARs are also frequently criticized as being atheoretical, although it is possible to derive VARs formally as reduced forms of dynamic structural models.

[7] In Clausing (2012), I consider a larger set of 12 VAR models, with similar conclusions.

Table 4

Vector Autoregression Results

	BLS Hourly	OECD Annual
Combined tax rate	1.85	3.65**
		(−0.0004)
Effective tax rate	0.99	1.14

Notes: The effect on wages in year six of the impulse response function is indicated below statistically significant F statistics. F statistics indicate joint statistical significance of tax variables in wage equations (5 lag specification). Asterisks denote significance at the 0.1% (***), 1% (**), and 5% (*) levels.

for the tax variables for each of these equations. If the tax variables as a group have a statistically significant effect on wage variables, the six-year impulse response effect of tax rates on wages is indicated below the F statistic. In three cases, there is no statistically significant relationship between lagged values of the corporate tax variables as a group and wages, controlling for prior wages. In one case the tax variables were jointly statistically significant. In this case, I consider impulse response functions to consider the effect of tax variables on wage outcomes. The overall effect of taxes on wages was ambiguous and very small, as the lagged tax variables had both positive and negative effects that nearly offset each other, resulting in an approximately zero net effect. Thus, at first glance, the VAR analysis does not support a clear causal relationship between corporate tax variables and wages.

Table 5 shows results for the same VAR analysis, using relative tax rates instead of level tax rates. Again, these relative tax variables were calculated as the country tax variable minus the OECD average for the same tax variable. Results were little changed; in all but one case the tax variables were jointly statistically insignificant. In the statistically significant case, the impulse response function shows that the six-year effect of taxes on wages was small and negative.

Given the known sensitivity of VAR analysis to the number of lags and variables included, I also experimented with other specifications. For example, I considered a model with ten lags for both level and relative tax rates. Table 6 shows the results for the relative tax term specifications; the level tax rate results were nearly identical. Of the four VAR systems, in three cases there was no evidence of a jointly statistically significant relationship between lagged values of the corporate tax variables and wages. In the other case, the impulse response function indicates an approximately zero net relationship.

As a further test of robustness, I tried the inclusion or substitution of different variables. In specifications not reported here, I utilized gross fixed capital formation to GDP ratios instead of capital-labor ratios. I also ran specifications including average years of schooling (of the population over age 25) and political variables in the analysis. In

Table 5

Vector Autoregression Results

	BLS Hourly	OECD Annual
Relative combined tax rate	2.18	4.09**
		(–0.012)
Relative effective tax rate	0.55	1.26

Notes: The effect on wages in year six of the impulse response function in indicated below statistically significant F statistics. F statistics indicate joint statistical significance of tax variables in wage equations (5 lag specification). Asterisks denote significance at the 0.1% (***), 1% (**), and 5% (*) levels.

Table 6

Vector Autoregression Results

	BLS Hourly	OECD Annual
Relative combined tax rate	2.20*	1.82
	(–0.001)	
Relative effective tax rate	0.58	1.38

Notes: The effect on wages in year six of the impulse response function in indicated below statistically significant F statistics. F statistics indicate joint statistical significance of tax variables in wage equations (10 lag specification, with relative tax terms). Asterisks denote significance at the 0.1% (***), 1% (**), and 5% (*) levels.

all cases, the pattern of results was quite similar to those reported here. I also ran the VAR models above without the investment terms in the wage regressions. Results were nearly identical.

IV. WHY DOESN'T THE CORPORATE TAX FALL ON LABOR?

The above results, together with a larger body of evidence in Clausing (2012), suggest skepticism regarding prior claims that labor will bear a large share of the burden of a corporate tax in a global economy. This is somewhat surprising, since open-economy general equilibrium models imply that corporate tax rate differences should generate capital movements from high-tax to low-tax countries, with associated effects on the marginal product of labor and wages. In this section, I examine five possible reasons for this (non) finding.

A. Present Methods of Analysis are Insufficient

The first possibility to recognize is that the open-economy general equilibrium corporate tax mechanism that lies at the heart of the prediction that labor will bear a large share of the corporate tax burden is difficult to identify with real world data. We are limited to a universe of about 30 comparably affluent countries with about 30 years of data of sufficient quality and comparability. Even with the large variation in corporate tax policies by countries over this time period, there remain many confounding influences on the data. It is indeed possible that corporate taxes have negative effects on wages that our data are simply too coarse to detect.

Unfortunately, prior studies that have uncovered such negative relationships in a cross-country environment may have been insufficiently careful in testing the robustness and sensitivity of their results. In these sorts of cross-country analyses, there are likely important omitted variables such as other elements of corporate tax policy aside from the tax rate, other elements of business-relevant policy variation such as other taxes and regulations, macroeconomic considerations, human capital considerations, immigration, the larger effects of global trade, the political environment, and so on. While time and country specific effects are included in the specifications above, they are not included in all prior research on these questions, and even when they are included, there may remain spurious relationships in these sorts of analyses.

An additional difficulty is that it is hard to measure both wage outcomes and tax variables in a way that is clearly comparable, even among OECD countries. Wages should be adjusted for purchasing power parity differences across countries, or exchange rates will swamp the other influences on wage variation. Care must also be taken to measure comparable workers and to adjust for inflation. Tax variables should ideally capture the sorts of tax policies that are important for the economic incentives at hand, and tax incentives often depend on more than a simple statutory or effective rate. Indeed, tax treatment varies across industries and firms, but once one focuses on subnational variation in tax treatment, it is easy to lose sight of the key theoretical mechanism behind open-economy general equilibrium tax incidence theory. However, these types of analyses may illuminate other features of the true nature of corporate tax incidence, as discussed in subsection C below.

B. Corporate Tax Incidence is (even) More Complicated than the Model

The open-economy Harberger models of general equilibrium tax incidence capture important mechanisms that are at work in determining the burden of the corporate tax. In general, these models imply that labor will bear a substantial burden, although Gravelle and Smetters (2006) is a notable exception. For example, Randolph (2006) builds on Harberger's open-economy model, using a numerical example to estimate that U.S. labor would bear 70 percent of the burden of the U.S. corporate tax. Capital owners worldwide cannot escape the tax, as the world capital stock is assumed fixed, but domestic owners shift much of the burden of the tax to others. In Randolph's example,

U.S. capital would bear 30 percent of the burden and foreign capital would bear 70 percent of the burden; workers abroad receive higher wages of a magnitude equal to the loss of U.S. labor, about 70 percent of the burden.

As noted above, the labor share would be lower if trade substitution elasticities were lower, or if other parameters are taken at their median values, according to Gravelle (2013). But even beyond these modifications, the Harberger-style model neglects several features of real-world corporate taxation that are likely to have consequences for incidence. First, as Gravelle and Hungerford (2011) note, since the current corporate tax has residence elements, that would cause it to fall more heavily on capital than the above models imply. Second, if the corporate tax in fact subsidizes debt-financed investments (due to interest payment deductibility and accelerated depreciation), then raising the corporate tax could actually cause capital inflows of debt-financed investments. This would also reduce negative impacts on workers.

Third, Auerbach (2006) notes that changes in corporate taxation have two distinct effects: effects on existing asset holders and effects on new investments. In the short run, an increase in the corporate tax will cause asset prices to fall and owners of old corporate capital assets will be hurt. Over time, the rate of return on investments changes, affecting the pattern of investment and wages. This consideration implies that modeling the lag structure of corporate tax policy effects is important. It also implies even graver difficulties for empirical researchers attempting to identify the incidence effects either contemporaneously or in the short run.

Fourth, the extent to which country corporate tax policy changes occur in isolation is an important factor. If countries follow one another in corporate tax policy, together their actions may be better modeled as a closed economy (Harberger, 2008). For example, if all countries raise or lower their corporate tax rate by the same amount, it will have different effects than if one country undertook the same policy change in isolation. Operating in tandem, the relative tax burdens across countries would stay the same, reducing the impetus for capital reallocation across countries and subsequent burdens on labor. This suggests that empirical researchers should pay attention not just to changes in absolute corporate tax rates but also to changes in relative corporate tax rates in comparison to other countries.

C. Corporate Tax Incidence Divides Rents

As Auerbach (2006) notes, if the corporate tax is actually a tax on rents, then it would not impose distortions on capital investment and would be borne by shareholders. The firms that pay corporate tax are very large, possibly suggesting a role for economies of scale and considerations of imperfect competition that may generate rents. For example, the IRS reports that in 2008, about one fiftieth of 1 percent of corporations remit over 65 percent of the corporate tax in the United States.[8]

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[8] The IRS shows this in Table 22, http://www.irs.gov/uac/SOI-Tax-Stats-Table-22-Returns-of-Active-Corporations,-Other-Than-Forms-1120S,-1120-REIT,-and-1120-RIC.

Considering the corporate tax as a tax on pure economic profit, or rents, alters the efficiency implications of the tax, as the tax has smaller effects on factor use choices if it falls primarily on pure profits rather than on corporate capital. This consideration also affects the policy implications of the tax. For example, if the rent-sharing mechanism is key, then cuts to the corporate tax will allow more rents to fall into the hands of shareholders and workers, who will share the excess returns. However, since labor markets are integrated across firms and industries, workers will eventually move from job to job and industry-to-industry, eroding wage differences. Thus, the economy-wide wage effects from such rent-sharing may be smaller than the rent-sharing specifications alone would lead one to believe.

Some of the empirical work referenced above examines industry or firm-level variations in tax treatment, explicitly considering the rent-sharing mechanism. These studies often find substantial rent-sharing with workers, though there are some confounding influences, and the labor economics literature rarely finds rent sharing to the degree found in these papers on corporate tax incidence.[9]

These findings complement some recent theory papers on corporate tax incidence that have focused on rent sharing, although it is important to note that the theoretical influence of corporate taxation on wages is ambiguous in such a framework. Riedel (2011) constructs a model of taxing multinational firms under wage bargaining. In this model, an increase in corporate taxes has two main effects on labor. First, it reduces the size of the pie to be bargained over, which directly lowers wages. Second, it increases the value of the payroll expense deduction, thus making the firm less sensitive to wage costs, which increases wages. Under reasonable parameter values, Riedel finds that the second effect dominates, so that wages increase with corporate taxes; extensions of the model generate ambiguous effects of corporate taxation on wages.

D. Adverse Effects on Labor may be Undone by Clientele Effects

The evidence in Section III indicates that there is not a clear robust relationship between corporate tax policy variables and investment levels or the resulting capital stocks across OECD countries over the previous 30 years. Still, one might question how to reconcile this evidence with the quite sizable body of evidence that indicates that foreign direct investment is quite responsive to corporate tax differences across countries. One possibility is that clientele effects may be important. Desai and Dharmapala (2009) find evidence of substitution between foreign portfolio investment and foreign direct investment in response to tax incentives. Also, as noted above, corporate taxation may actually subsidize debt-financed investments.

In general, the type of investment (portfolio versus direct, debt versus equity financed, etc.) may be far more sensitive to corporate tax treatment than the overall level of investment that determines the resulting capital stock. If corporations are mere intermediaries

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[9] For examples of the larger literature, see Budd, Konings, and Slaughter (2005), Van Reenen (1996), and citations within these papers.

in global capital markets in which a wide assortment of investors with different tax treatments invest, tax policy changes could affect the ownership and financing patterns of assets more than they affect the aggregate level of investment in different countries.

Somewhat surprisingly, there is little cross-country evidence on the relationship between corporate tax variables and overall investment or capital stocks outcomes, despite a large literature on the relationship between corporate taxation and foreign direct investment, reviewed in the meta-analyses of de Mooij (2005) and de Mooij and Ederveen (2003, 2008). Djankov et al. (2010) note a large literature, to which they contribute, that suggests a relationship between corporate taxation and investment. As they note, other studies do not typically use cross-country analysis. In their analysis, they employ a cross-section of 85 countries in 2004. They find statistically significant relationships between both statutory and effective tax rates and foreign direct investment; effective tax rates, but not statutory rates, have a statistically significant effect on overall investment. Yet the influence of effective tax rates on investment is still subject to caveats: (1) the absence of time series variation makes it impossible to control for country-specific fixed effects; (2) the effect loses statistical significance when a complete set of control variables is added; and (3) the effect loses statistical significance if Bolivia is excluded from the analysis, as noted by Gravelle and Hungerford (2011).

## E. Adverse Effects on Labor may be Undone by International Tax Avoidance

In recent decades, the economy has become more global, leading to a rethinking of corporate tax incidence. Yet, accompanying this globalization, there has been an increased divergence between the location of economic activity (such as investment, employment, and sales) and the location of income for tax purposes. I have discussed these trends at great length in prior work, including Clausing (2009, 2011), Avi-Yonah and Clausing (2008), and Avi-Yonah, Clausing, and Durst (2009).

For example, Figure 7 shows data for affiliates of U.S. based multinational firms. The share of total foreign operations for each country is shown; countries are sorted by the effective tax rate of the U.S. affiliates that operate there. Countries are included if either their worldwide employment share or their worldwide pre-tax income share is at least 2 percent of the total for all U.S. multinational affiliates. A pattern is easily discernible. For the low-tax destinations, income shares are far higher than employment shares; for high-tax countries, the opposite relationship holds.[10]

This divergence could reduce the wage effects of relative corporate tax rates, since internationally agile firms can move income without commensurate movements of investment and jobs. Indeed, many of the most global companies have become increasingly adept at the creation of stateless income, as discussed in Kleinbard (2011). If firms can respond to tax differences among countries through financial or organizational decisions, this will lower the tax sensitivity of real activity, thus reducing adverse effects on labor associated from tax-induced reductions in the capital stock.

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[10] Norway is the lone exception, where the data may reflect the importance of oil industry income.

Figure 7

Shares of Total Foreign Income and Employment by Location, 2008
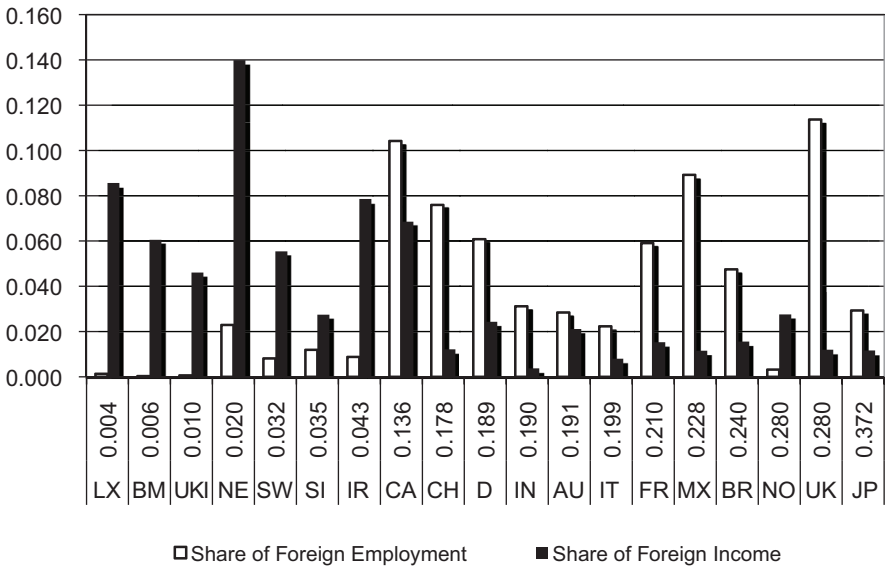
Note: These data are sorted by the effective tax rate of all U.S. affiliates in each location and are from the U.S. Bureau of Economic Analysis. The data show only foreign affiliates of U.S. multinational firms. Locations are included in the figure if they have either 2 percent or more employment or income shares. The effective tax rate is calculated as actual taxes paid relative to pre-tax net income. Effective tax rates for Norway and the United Kingdom are capped at the statutory tax rate. Destinations included are Luxembourg, Bermuda, the UK Caribbean Islands, the Netherlands, Switzerland, Singapore, Ireland, Canada, China, Germany, India, Australia, Italy, France, Mexico, Brazil, Norway, the United Kingdom, and Japan. Source: Bureau of Economic Analysis, http://www.bea.gov/iTable/index_MNC.cfm

A preliminary examination of the tax payments of the largest U.S. corporations supports the idea that some firms are far more global than others, and the global firms are more adept at lowering their effective U.S. tax burden well below the statutory rate. Helman (2011) and McIntyre et al. (2011) consider data from financial statements, demonstrating that effective tax rates vary widely. Large domestic firms, like Walmart and CVS, often have high effective tax rates. Globally integrated firms, like GE, Hewlett-Packard, IBM, and Procter and Gamble, have far lower effective tax rates. Indeed, the global firms that are most likely to fit the open-economy version of the corporate tax incidence models are the same firms that are adept at lowering their effective tax rates, whereas domestic firms are likely to behave more like closed-economy agents.

V. POLICY IMPLICATIONS

In the United States, there is widespread dissatisfaction with the current corporate tax system, and myriad reforms have been suggested. Most proposals suggest a lower corporate tax rate, in the context of steady declines in corporate tax rates among other OECD countries. Figure 8 shows the path of statutory corporate tax rates for OECD countries over the previous 30 years. Still, despite declining rates, corporate tax revenues have not declined in typical OECD countries, as shown in Figure 9. Indeed, many corporate tax rate cuts have been accompanied by measures to broaden the corporate tax base.

Some economists have welcomed decreasing corporate tax rates as a small step toward removing capital taxation in general, which can generate large inefficiencies in infinite-horizon dynamic models. Other economists deem these models to be unrealistic. They note that in practice, savings rates are often relatively insensitive to tax incentives, implying that capital taxation need not be especially inefficient. Further, new models of capital taxation have been developed that challenge the main assumptions and findings of the literature that emphasized the inefficiencies of capital taxation. Models that incorporate incomplete capital markets, life-cycle motivations for savings,
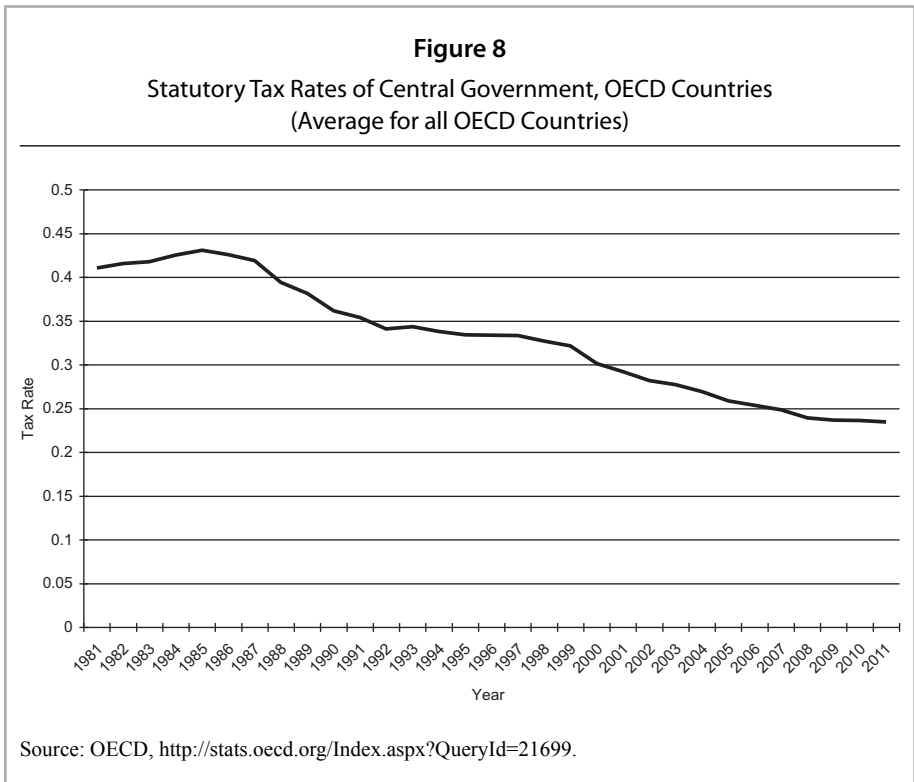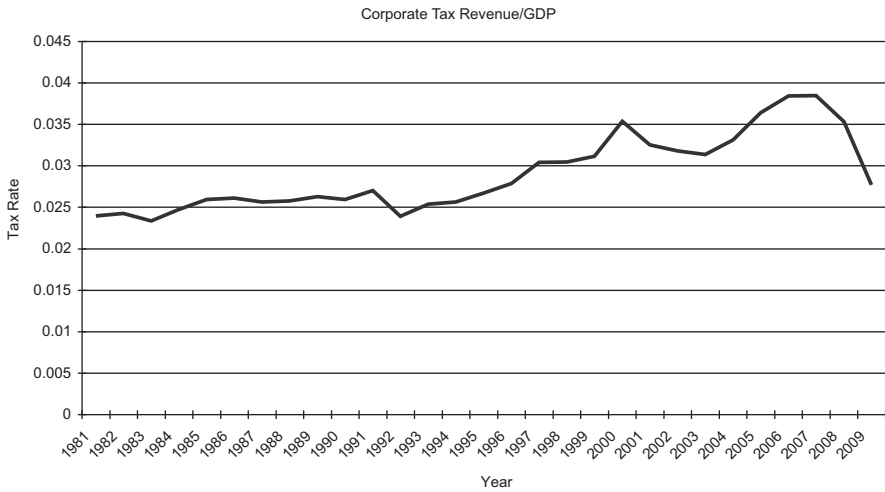

Figure 8

Statutory Tax Rates of Central Government, OECD Countries
(Average for all OECD Countries)

Source: OECD, http://stats.oecd.org/Index.aspx?QueryId=21699.

Figure 9

Corporate Tax Revenues/GDP, OECD Countries
(Average for all OECD Countries)

Source: OECD, http://stats.oecd.org/Index.aspx?QueryId=21699.

inheritance, uninsurable idiosyncratic shocks, or political economy considerations can generate important roles for capital income taxation at rates that are similar to those applied to labor income.[11]

However, even if one set aside these theoretical debates, there are still three important pragmatic reasons to retain the corporate tax, choosing reforms that reduce inefficiencies but keep the broad features of modern corporate taxation. First, the corporate tax is an important revenue source in a time of budget shortfalls. The corporate tax typically accounts for about 10 percent of U.S. tax revenues in recent years, or about 2 percent of GDP.

Second, the corporate tax is a crucial backstop protecting the individual income tax system; without a corporate tax, the corporate form could provide a huge tax-sheltering opportunity, particularly for high-income individuals (Gravelle and Hungerford, 2011).[12] Indeed, there is evidence that shifting between capital and labor tax bases takes place

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[11] Conesa, Kitao, and Krueger (2009), Piketty and Saez (2012), Diamond and Saez (2011), and Farhi et al. (2012) are examples of such studies.

[12] Gravelle and Hungerford show that sheltering opportunities exist when corporate rates fall below personal income tax rates and corporations retain a large share of their earnings. For example, a reduced corporate tax rate of 27 percent would provide sheltering opportunities for corporations that distribute less than 73 percent of their earnings.

in response to tax rate differentials, as shown by Pirttila and Selin (2011), Gordon and Slemrod (2000), and Gordon and MacKie-Mason (1995).

Third, and most relevant to the present analysis, the corporate tax is likely to fall predominantly on capital or on economic profits. Thus, the corporate tax has a vital role in maintaining the progressivity of the tax system. In an era of persistent and dramatic increases in income inequality, progressivity is an essential desideratum.

Therefore, this section assumes that corporate taxation is desirable, considering several categories of reform options. First, incremental improvements can address the many distortions introduced by the peculiar form of the corporate tax. Second, issues surrounding organizational form are addressed. Third, options for reforming the international taxation of multinational firms are considered.

A. Incremental Improvements

There are many inefficiencies introduced by particular features of the corporate tax. For example, in the United States, accelerated depreciation rules, production income deductions, and various other special rules, credits, and deductions create uneven tax treatment among different corporate sectors. The different treatment of debt and equity is also a critical distortion. Debt-financed investments receive a small subsidy through the corporate tax system, since interest payments are deductible for the firm (although interest receipts are taxable at the bondholder level if the debt is held by taxable individuals), whereas equity-financed investments are taxed at a rate above the corporate rate, since dividends and capital gains are taxed at the personal level, albeit at lower rates.

Some of these distortions can be addressed through simple base-broadening, rate-lowering reforms. Lower rates reduce the distortion between debt and equity distortion, alongside other distortions of the tax, and lower rates could be accompanied by reforms that reduced or eliminated the relative preferences caused by accelerated depreciation rules, the production income deduction, and other special tax deductions and credits. Also, some suggest disallowing the inflationary component of interest deductions. This would both raise tax revenue and lower the distortion between debt and equity finance (although in principle it should be accompanied by the taxation of only real interest income).

B. Organizational Form

Another major issue surrounding the corporate tax is the inefficiency associated with distorting the organizational form of business activity. Depending on the relative tax rates of the top personal income tax rate, the corporate tax rate, and the tax rates on dividends and capital gains, entrepreneurial activity may be relatively tax advantaged in some types of organizational forms. At present, the non-corporate form is typically tax-preferred relative to the corporate form. These distortions would also be reduced by rate-lowering, base-broadening reforms.[13]

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[13] Still, if the corporate rate fell much below the top individual rate, the corporate form would provide tax-sheltering opportunities.

A related concern is the double taxation of corporate income, first at the corporate level, and then at the personal level. Of course, some aspects of double-taxation debates are silly, since the overall level of tax burden surely matters more than the number of taxes. For example, most savers would prefer two 5 percent taxes on capital income to one 20 percent tax. However, resolving the double-taxation issue is more difficult than it appears at first glance. If all taxation is moved to the personal level, some capital income that is held tax-free in pensions, endowments, and non-profits would go untaxed. Gravelle and Hungerford (2011) note that over 50 percent of individual passive income is held in tax-exempt form through pensions, retirement accounts, life insurance annuities, and non-profits.

Still, raising the tax rate on personal dividends and capital gains while lowering the corporate tax rate may be good tax policy. It would both lessen the distortions associated with the corporate tax and increase the ease of enforcement, since it is likely more difficult for individuals to avoid capital taxes than it is for corporations.[14] A similar plan has been discussed in Altshuler, Harris, and Toder (2010).

Another option for reducing possible double taxation of corporate equity income would be to allow individuals reporting investment income in the form of capital gains or dividends credit for taxes already paid at the corporate level. For example, Burman (2003) proposes such a solution, although there may be concerns regarding the complexity of this approach. Recently, the Mirrlees Review on tax reform in the United Kingdom, discussed in Mirrlees et al. (2012), suggests a similar approach to integration, since there would be reduced tax rates for dividends and capital gains on shares where corporate tax had already been paid.

However, the Mirrlees review also suggests that the normal return to capital be entirely exempt from taxation. It achieves this through a combination of policy changes that include an allowance for corporate equity (ACE) within the corporate tax. This feature would eliminate the distortion between debt and equity by providing a similar tax preference for equity-financed investments. The intent is to exempt the normal return to capital from taxation and only tax excess returns. Auerbach (2012) and Devereux (2012) also discuss the Mirrlees review. As Auerbach notes, it is not clear that such a generous treatment of the normal return to capital is justified, given recent developments in the theory of capital taxation, also discussed in this section (above). Devereux further regrets that the Mirrlees review does not address the more difficult problems associated with the taxation of internationally mobile corporate income.

C. International Tax Reforms

There is a substantial consensus that the U.S. system of taxing international income is particularly flawed. Rules are mind-numbingly complex, enforcement, administra-

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[14] Most assume that corporations have more opportunities for tax avoidance than individuals do, although estimates of the world's wealth in tax havens are large. Zucman (2012) estimates that 8 percent of the world financial wealth of households is held in tax havens, and that most of it is unrecorded.

tion and compliance are very costly, the statutory corporate tax rate is high, and U.S. corporate tax revenues are a relatively low share of GDP in comparison with other OECD countries.

Further, the system itself encourages the shifting of both profits and the underlying sources of economic activity to low-tax countries. The United States uses a worldwide system of taxation, nominally taxing international income, yet deferral of U.S. taxation on foreign income until repatriation, cross-crediting, and other rules lighten the taxation of international income substantially.

However, there is more consensus on the need for international reform than there is on the underlying characteristics of possible reforms. Possible reforms discussed here include: (1) moving to a territorial system; (2) ending or limiting the advantages of deferral; and (3) a formulary apportionment system for taxing international income.

1. Territorial Systems

Many countries use territorial systems of international taxation that exempt foreign income from taxation, and two prominent countries — the United Kingdom and Japan — have recently adopted territorial systems of taxation. Many in the United States have argued that adoption of a territorial system is required in order for U.S. based multinational firms to compete with those in other countries. While territorial systems have some merits, these arguments ignore a crucial fact: foreign territorial systems often tax foreign source income far more heavily than is the case under the present U.S. system.

For example, under typical territorial systems in other countries, some foreign income is taxed currently, even if it is not repatriated. Japan taxes foreign income currently when the foreign tax rate is less than 20 percent; in other countries, foreign income is taxed currently if the host country tax rate is less than one-half or three-fourths of the home country rate (Joint Committee on Taxation, 2011). In comparison, the U.S. system facilitates the creation of "stateless income" through its "check-the-box" regulations and other rules that allow firms to generate income that is not taxed anywhere. Kleinbard (2011) discusses such features of the U.S. tax system in detail.

Indeed, it is possible to create a territorial tax system that has a higher tax burden on foreign income than the present U.S. system, making one question whether moving toward a territorial system would enhance the competitiveness of U.S. multinational firms. However, many multinational firms favor a territorial system that will, on net, lighten the U.S. tax treatment of foreign income, and the political process may be far more likely to generate a generous territorial system than the "tough" systems. While such a system would reduce concerns that repatriation is discouraged by the U.S. worldwide system, it would also dramatically relax the remaining constraint on shifting income abroad, likely generating large revenue losses.

In terms of the analysis of this paper, though, one should remember that international corporate tax avoidance comes with a silver lining. If multinational firms can move income without moving underlying investments, corporate tax rate differences among countries need not depress wages in high-corporate tax countries. Mobile firms simply

avoid the tax, while immobile firms are not able to respond to taxation in a way that lowers worker wages. Still, a territorial system would generally make multinational firms more tax-sensitive in their real investments abroad, and if this is not undone by tax avoidance or clientele effects, the enhanced tax sensitivity of real investments could have negative effects on workers.

2. Ending or Limiting Deferral

Proposals to end or limit deferral of U.S. taxation on foreign income also come in many flavors, but most would lower the corporate tax rate alongside measures that limit the advantages of deferral. Examples include the proposed legislation of Wyden (D-OR) and Coats (R-IN) that would repeal deferral and lower the corporate rate to 24 percent, as well as the reforms suggested by the Obama Administration that would put in place a minimum tax on foreign income earned in low-tax countries alongside a lower corporate tax rate. Grubert and Altshuler (2008) have also suggested a burden-neutral worldwide taxation plan that would combine the current taxation of foreign income (ending deferral) and a 28 percent corporate tax rate.

Kleinbard (2011), after discussing the scope and magnitude of the stateless income problem, ultimately recommends a worldwide approach that would tax foreign earnings currently, under a residence-based system where firms are required to consolidate the earnings of foreign subsidiaries. He also wrestles with the possibility of a territorial tax system, but he concludes that it would be fundamentally impossible in a modern economy to determine the true source of income when so much of major multinational firms' profits are generated by intangible assets and internal synergies. This approach, however, does place importance on adequate legal definitions of residency as well as determining the ideal threshold for consolidation; Kleinbard also recommends that such a proposal be combined with a lower corporate tax rate.

These proposals would have many benefits relative to the status quo. In particular, they reduce the inefficiencies and distortions of the corporate tax by lowering the rate, yet they simultaneously reduce the incentive to shift income and economic activities to low-tax countries. In terms of the corporate tax incidence question, a lower tax rate and limiting deferral would both lower the incentive to move real investments abroad.

3. Formulary Apportionment

In prior work, I have extensively discussed the advantages of a formulary apportionment system as well as possible drawbacks and how they might be addressed. Under a formulary apportionment system, worldwide income is allocated to individual countries by a formula that reflects their real economic activities. This stands in contrast to separate accounting systems that require firms to separately account for their income and expenses in each country.

If the United States adopted a formulary system, multinational firms would pay U.S. taxes on the share of its worldwide income that was allocated to the United States by the

formula. One common formula would equally weight asset, sales, and payroll shares in the United States. An essential advantage of the formulary approach is that it provides a concrete way for determining the source of international income and it is not sensitive to arbitrary features of corporate behavior such as a firm's declared state of residence or its organizational structure.

Further, the factors in the formula are real economic activities rather than financial determinations. As summarized by Slemrod and Bakija (2008) and Auerbach and Slemrod (1997), there is a vast amount of empirical research on taxation that suggests a hierarchy of behavioral responses. Taxpayers are most responsive when the timing of transactions affects taxation, and taxpayers are also responsive in undertaking financial or accounting responses to taxation; by comparison, real economic decisions concerning employment or investment are far less responsive to taxation. As demonstrated in Figure 7 above, there is a similar pattern of tax response for U.S. multinational firms and their affiliates.

A detailed discussion of the advantage and disadvantages of a formulary approach is included in my prior work, and space does not allow more discussion here.[15] However, in terms of the present analysis, the advantages of a formulary approach come with an important drawback. Since formulary apportionment would base tax liabilities on the factors in the formula, it would increase the real responsiveness to tax differences among countries, thus exacerbating possible adverse effects associated with a reallocation of capital due to tax rate differences among countries. While formulary approaches would dramatically reduce international tax avoidance due to accounting manipulations of the source of income, the silver lining of tax avoidance would also be reduced, since mobile multinational firms could become more tax sensitive in their real decisions.

For this reason, Avi-Yonah and Clausing (2008) suggest a formula based solely on the destination of sales factor, and Avi-Yonah, Clausing and Durst (2009) suggest a formulary profit-split method that also relies on a sales-based formula. With carefully crafted legislative implementation, these types of approaches lessen concerns regarding increased real responses to tax rate differences under a formulary approach.

VI. CONCLUSION

The extent of international integration of the global economy requires a rethinking of corporate tax incidence. More than ever before, multinational firms are able to respond to international tax rate differences in their economic behavior. According to modern theories of open-economy general equilibrium tax incidence, workers may bear a substantial share of the corporate tax burden.

However, this paper provides several reasons to suspect that workers have thus far remained insulated from their countries' corporate tax policies. While prior work had identified burdens on workers from high corporate tax rates, a careful literature review

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[15] This work includes Clausing (2009, 2011), Avi-Yonah and Clausing (2008), and Avi-Yonah, Clausing, and Durst (2009).

reveals that this work suffers from essential drawbacks. Together with new evidence from the present analysis and also in Clausing (2012), one is left with a discrepancy between the theoretical expectation that workers will bear a large share of the corporate tax burden in a global economy and the empirical reality that there is very little robust evidence linking corporate tax rates and wages.

There are several potential solutions to this puzzle. One can conclude that the data are simply too coarse to robustly pick up these theoretical mechanisms, or one can conclude that the theory itself is not an adequate depiction of reality and misses features of corporate taxation and competition that are important for understanding corporate tax incidence. It is also important to note two ways in which globalization itself may undermine the open-economy general equilibrium tax incidence result. First, if corporations are mere intermediaries in global capital markets in which a wide assortment of investors with different tax treatments invest, tax policy changes could affect the ownership and financing patterns of assets more than they affect the aggregate level of investment in different countries. Second, since multinational firms have become increasingly adept at separating the reporting of income from the true location of the underlying economic activities, international tax avoidance itself comes with a silver lining. Mobile firms move profits without needing to substantially alter the underlying investments, whereas immobile firms do not respond like the open-economy actors of modern corporate tax incidence models. In both cases, workers in high-tax countries are relatively insulated from adverse wage effects due to capital reallocation toward low-tax countries.

The insights of this paper generate several policy-relevant considerations. First, there is already a strong case for rate-lowering, base-broadening corporate tax reforms. Any possible adverse effects on workers from high corporate tax rates just make that case stronger. Second, international tax reforms need to pay particular attention to tradeoffs that come from competing policy goals. Territorial systems of taxation would both heighten tax sensitivity of real investments to tax differences among countries and also (likely) widen the escape valve of income shifting out of high-tax country jurisdictions; a truly "tough" territorial system would predominantly have the former effect. On the other hand, limits on deferral, when combined with a lower rate, reduce incentives to move both real investments and income abroad. Finally, a formulary apportionment approach, while curbing the tax sensitivity of income reporting, would need to be designed carefully in order to avoid heightening real responses to tax differences among countries, since real responses generate greater concern about adverse effects on labor.

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