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THE EFFECT OF PROFIT SHIFTING ON THE CORPORATE TAX BASE IN THE UNITED STATES AND BEYOND

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This paper estimates the effect of profit shifting on corporate tax base erosion for the United States, using Bureau of Economic Analysis survey data on U.S. multinational corporations during 1983 to 2012. I find that profit shifting is likely costing the U.S. government between $77 billion and $111 billion in corporate tax revenue by 2012, and these revenue losses have increased substantially in recent years. The paper also extends this analysis to other countries, finding that corporate tax base erosion is likely a large problem in countries without low tax rates. The paper discusses suggested reforms.

Keywords: international taxation, income shifting, tax avoidance, corporate tax revenue

JEL Codes: H25, H26, H73

I. INTRODUCTION

Corporate tax base erosion due to profit shifting is a large and consequential problem. Reduced revenues from one source must be compensated for by higher tax revenues from other sources or lower government spending or increased budget deficits; none of these possibilities is particularly attractive.

Beyond revenue consequences, corporate tax base erosion and profit shifting also affect the integrity of the tax system. National (or subnational) governments set tax policies, yet in an increasingly global world economy, the effects of these policy actions extend beyond borders. Multinational firms adroitly and aggressively respond to differential tax treatment, changing the geographic location of both economic activity and profits. Governments, realizing the mobility of global business, set tax policies that explicitly (or often, less transparently) lower tax rates on global firms. Such tax competition pressures are discussed elsewhere, but they suggest that international tax system design needs updating in the face of globalization.[1]

[1] See, e.g., Clausing (2016a) and other contributions to Dietsch and Rixen (2016).

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Further, corporate tax base erosion has consequences for the distributional burden of the tax system as a whole, consequences that are noteworthy due to the large documented increases in income inequality in recent decades. Most relevant evidence suggests that the corporate tax falls largely on capital or shareholders, but even if one assigns a fraction of the burden of the corporate tax to workers, it is still a more progressive tax instrument than other major sources of revenue. Further, much capital income goes untaxed at the individual level, since a majority of such income is held in non-taxable form.[2] Thus, the corporate tax has an essential role in taxing capital income, which is far more concentrated at upper income levels than labor income.

In this context, it is important to estimate the size of the problem at hand. Almost all observers, both in the press and in academic research, describe corporate tax base erosion and profit shifting as an increasing problem. Indeed, the analysis below suggests that base erosion and profit shifting is a larger problem today than ever before. The revenue cost to the U.S. government from profit shifting has been increasing steadily over the previous decades, reaching $77 billion to $111 billion by 2012, over 30 percent of U.S. corporate income tax revenues. These revenue losses have increased substantially in recent years; in dollar terms, revenue losses have increased by about 250 percent since 2004. For the world as a whole, including the United States, revenue losses may be in excess of $280 billion in 2012.[3]

The results here are broadly consistent with prior published findings in the literature discussed in Section II below, including Dowd, Landefeld, and Moore (2016), Organisation for Economic Co-operation and Development (OECD) (2015), Crivelli, Keen, de Mooij (2015), de Mooij and Ederveen (2008), and de Mooij (2005). Though there is some work using financial statement data, particularly from Europe, that suggests that the profit shifting problem may be shrinking, this work is based on incomplete data.[4]

The paper proceeds as follows. In Section II, I briefly review current knowledge on base erosion and profit shifting. In Section III, I present estimates of the size of the problem for the United States, and in Section IV, I extend those estimates for a speculative estimate of base erosion consequences for other countries. Finally, Section V discusses policy implications.

II. PRIOR WORK

There is a large body of work on international profit shifting, indicating that the corporate tax base is quite sensitive to tax rate differences across countries. An early

[2] Rosenthal and Austin (2016) show that only 24 percent of C Corporation equity is held in taxable accounts in 2015. Burman and Clausing (2016) find similar results using data from a broader range of sources, all of which suggest that only a minority fraction of corporate equity is subject to individual income taxation in the United States. (although the fraction may be somewhat higher than estimated by Rosenthal and Austin). Gravelle and Hungerford (2011) note that a majority of individual passive income in the United States is held in tax-exempt form through pensions, retirement accounts, life insurance annuities, and non-profits.

[3] The following analysis is limited to the other countries of the world that act as headquarters to major multinational firms.

[4] As discussed further below, this research often uses data from Orbis, which has extremely limited information on tax haven countries. Morevoer, even when observations exist, key data fields are often missing. Analysis using these data thus excludes many of the observations that are driving most of the income shifting behavior.

review of literature in this area is provided by Hines (1999) and subsequent reviews by de Mooij and co-authors (de Mooij and Ederveen, 2003; de Mooij, 2005; and de Mooij and Ederveen, 2008) have confirmed that the problem of income shifting is large and increasing. My prior work has provided evidence of the tax sensitivity of transfer prices (Clausing, 2001, 2003, 2006) as well as the consequences of profit shifting behavior for U.S. government revenues (Clausing, 2009, 2011).

This work provides a preface to more recent estimates of the base erosion and profit shifting problem, including those of the OECD. The OECD (2015) finds that the annual net tax revenue loss from tax planning is about $100 billion to $240 billion, and compares their estimates with those of the International Monetary Fund (IMF), the Joint Committee on Taxation (JCT), and others.

Three IMF economists (Crivelli, Keen, and de Mooij, 2015) find that base erosion problems are also quite large in developing countries, and indeed are likely to be more important (as a share of GDP) in this group of countries than in OECD countries. Their calculations indicate large revenue losses from base erosion due to profit shifting. Short run estimates are quite comparable to those found here; OECD countries lose $207 billion in revenue (0.23 percent of GDP) and developing countries lose $105 billion in revenue (0.84 percent of GDP). Long-run estimates are $509 billion for OECD countries, 0.6 percent of their GDP, and $213 billion for developing countries, 1.7 percent of their GDP.

Keightley and Stupak (2015) describe the large and increasing problem of base erosion and profit shifting in the United States and elsewhere. Using several data sources including Bureau of Economic Analysis (BEA) survey data as well as international data on foreign direct investment from the IMF and the United Nations Conference on Trade and Development, they view the problem through several different lenses, all of which are consistent with a large amount of profit shifting.

Indeed, the stylized facts are overwhelming in their confirmation of the scale of the profit shifting problem. For U.S. multinational firms, the share of income reported in foreign countries has been steadily increasing, and income booked in low-tax countries is implausibly high by any reasonable metric. As reported by Gravelle (2015), U.S. affiliate firm profits were 645 percent of Bermuda's GDP and 547 percent of the Cayman Islands GDP in 2004.[5] As absurd as these numbers are, they increased by 2010, to 1,614 percent for Bermuda and 2,065 percent for the Caymans. Further, estimates indicate that U.S. multinational firms have accumulated over $2 trillion in permanently reinvested earnings in low-tax locations, over $1 trillion of which is held in cash.[6]

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[5] Similar stylized facts regarding the scale of the problem are reported by many sources, including Keightley (2013) and McIntyre, Phillips, and Baxandall (2015).

[6] See, e.g., Kleinbard (2015) and Murphy, "Indefinitely Reinvested Foreign Earnings on the Rise," *The Wall Street Journal*, May 7, 2013, http://blogs.wsj.com/cfo/2013/05/07/indefinitely-reinvested-foreign-earnings-on-the-rise/. These funds are often held in U.S. financial institutions, and are thus available to U.S. capital markets, but U.S. multinational corporations are constrained in their use of these funds. These funds are assets of the firm that increase the firm's credit worthiness; however, firms cannot return the cash to shareholders as dividends or share repurchases without incurring U.S. corporate tax liabilities upon repatriation.

Due to the large amounts of income booked in low-tax countries and havens, the estimated costs of deferral has been increasing in recent years, and the JCT now estimates this tax expenditure at $83.4 billion for 2014. OMB estimates are somewhat lower, at $61.7 billion in 2014.[7] Zucman (2014, 2015) uses balance of payments data to conclude that profit-shifting to low-tax jurisdictions is reducing U.S. corporate taxes by about 20 percent, or about $130 billion annually.

Further, there is no question that this issue extends beyond U.S. multinational corporations. American firms are clearly not the only tax planners. In fact, analyses using Orbis data on disproportionately European firms, even when they cannot examine tax haven affiliate observations in detail, still find substantial magnitudes of income shifting, as shown by OECD (2015) and others.

Of course, one of the difficulties in estimating the scale of the profit shifting problem is that only limited data are available, as well as the difficulty associated with establishing the counterfactual levels of profit in each country absent profit shifting incentives. OECD (2015) describes this problem in detail, noting that existing data sources are far from ideal. For example, the report highlights the difficulties associated with using financial reporting data to make inferences regarding profit shifting behavior.

> What is striking is that when one looks into the micro-data available, much of this newly revealed information does not appear to be visible — either because certain affiliates are not included or, where they are included, the financial information is missing. This reveals a clear disconnect between the information revealed through targeted public enquiries of some MNEs and the limited available tax information for those same MNEs from consolidated financial statements (OECD, 2015, pp. 30–31).

Importantly, data are particularly likely to be missing for tax haven countries, and there are few if any observations of affiliate firms in tax havens that include the relevant data fields.[8] Since tax havens are the destination for much profit shifting activity, making inferences on the scale of profit shifting from data that exclude such observations can be problematic. As an example, my estimates below suggest that 82 percent of profit shifting by U.S. multinational firms is destined for just seven tax haven locations.

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[7] This represents the estimated revenue cost associated with allowing deferral of the U.S. tax on foreign income until it is repatriated (Joint Committee on Taxation, 2014; Office of Management and Budget, 2015).

[8] Cobham and Loretz (2014) document that data coverage in these financial data sets, and in particular Orbis, can be particularly weak or nonexistent where tax havens and less developed countries are concerned. Dowd, Landefeld, and Moore (2016, p. 3) note an important weakness of studies relying on financial reporting data: "It can be difficult to get information on subsidiaries incorporated in some tax havens, such as Bermuda and the Cayman Islands, and therefore studies using this data leave out some of the major locations for income shifting." My discussions with several researchers who use these data have confirmed that this is a large problem.

OECD (2015) also discusses other sources of information on base erosion and profit shifting activity. They highlight both U.S. BEA data, the data used in the present analysis, and tax return data as examples of best practices in data collection for analyzing base erosion and profit shifting.

In one example using nearly ideal data, Dowd, Landefeld, and Moore (2016) provide a careful study on the scale of profit shifting using U.S. tax return data from 2002–2010. Interestingly, and plausibly, they find a nonlinear tax response, with far more responsiveness at lower tax rates than at higher ones. Findings indicate tax semi-elasticities of –4.7 at corporate tax rates of 5 percent and –0.6 at tax rates of 30 percent.

Others have smaller estimates of the profit shifting problem. In a recent working paper, Heckemeyer and Overesch (2013) provide a meta-analysis of income shifting studies. From this analysis, they conclude that their best prediction of the tax semi-elasticity of corporate profits is –0.8, much smaller than what the above estimates and other literature indicate. However, their meta-analysis relies on 25 studies, the vast majority of which use financial data that are not well-suited to studying the question at hand for the reasons just discussed.

Dharmapala (2014) also argues that the income shifting problem is likely diminishing relative to the findings of earlier studies, basing his conclusion in part on the Heckemeyer and Overesch survey.[9] While he acknowledges that Orbis data are (perhaps solely) responsible for the lower estimates in the recent literature, as well as the sense that the problem itself may be shrinking over time, he views the strengths of the data positively without focusing on the drawbacks associated with relying on these data.[10] He does note the inconsistency between these findings and the stylized facts regarding income shifting activity.

My estimates below confirm the large scale of the profit shifting problem, and are consistent with the work of OECD (2015), Crivelli, Keen, and de Mooij (2015), Keightley and Stupak (2015), Dowd, Landefeld, and Moore (2016), Zucman (2014, 2015) and many earlier studies reviewed in de Mooij and Ederveen (2008). The estimates below rely on U.S. BEA survey data; these data are more suited to capturing the profit shifting problem than many other data sources.

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[9] Dharmapala (and others) have noted that corporate tax revenues are a small share of revenue for most developed countries, and that revenues have been relatively stable despite claims of increasing base erosion and profit shifting. Yet, as pointed out by Zucman (2014, p. 133), it is important to remember that corporate profits have been increasing in recent years: "How can we reconcile the sharp decline in the effective corporate tax rate with the widely noted fact that corporate tax revenues have not declined as a share of U.S. national income over the last 30 years …? The answer is that corporate profits have risen as a share of national income over time, from about 9 percent in the 1980s ... to about 14 percent in 2010–2013."

[10] Dharmapala places a large emphasis on the importance of controlling for firm-specific fixed effects. Still, due to the heterogeneity of the firms themselves, as well as the difficulty of capturing income shifting incentives based on changing firm tax treatments over time, it is likely that estimates using firm-level fixed effects may be a lower bound on income shifting behavior, even ignoring the substantial flaws and limitations of the Orbis data.

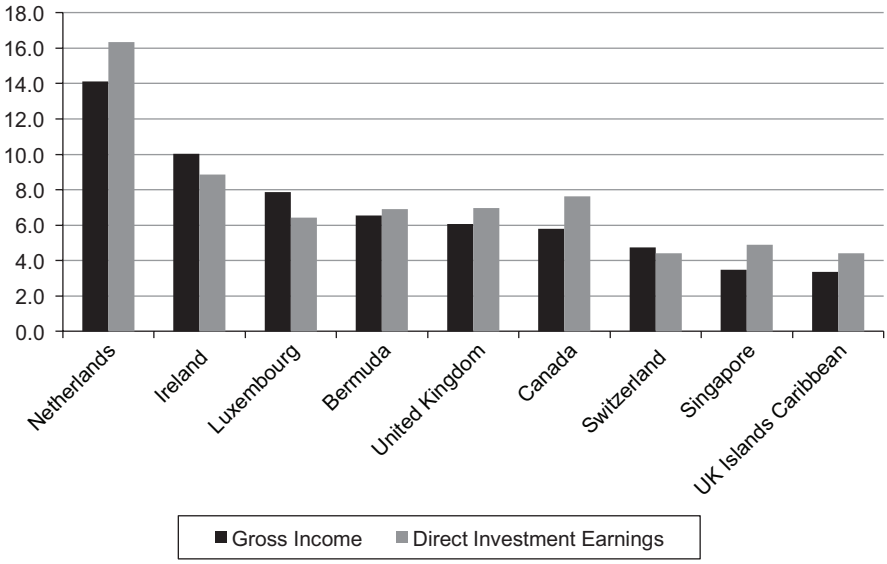
III. THE MAGNITUDE OF INCOME SHIFTING

A. Data and Regression Analysis

The U.S. Bureau of Economic Analysis does annual surveys of U.S. based multinational firms and their affiliated firms abroad. These data indicate a large discrepancy between the physical operations of U.S. multinational firm affiliates abroad and the locations in which they report their income. For example, Figure 1 shows the top locations of U.S. multinational firm affiliate gross profits in 2012; gross profits are net

Figure 1

Top Gross Income and Direct Investment Earnings Countries, Affiliates of U.S. Multinational Firms, 2012 (Shown as Percentage of Total Income)



Notes: Gross income is net income with foreign tax payments added; differences with the direct investment earnings series are described in the text. The figure shows the top nine gross income and direct investment earnings countries; the list of top countries is the same for both series, thought there are small changes in ordering. Seven of the top nine countries (for both series) have effective tax rates under 5 percent in 2012: Netherlands, Ireland, Luxembourg, Bermuda, Switzerland, Singapore, and UK Islands. Together, these seven countries account for 50.1 percent of all foreign profits and 52.3 percent of all direct investment earnings.

income with foreign income tax payments added.[11] Of the top nine locations, seven of them are tax havens with effective tax rates less than 5 percent: Netherlands, Ireland, Luxembourg, Bermuda, Switzerland, Singapore, and the UK Caribbean Islands (including the Caymans). Effective tax rates are calculated as foreign income taxes paid by all affiliates in a given country relative to their gross income (net income plus foreign tax payments). These countries alone account for 50 percent of all foreign income earned by affiliates of U.S. multinational firms, but they only account for 5 percent of all foreign employment of such firms. Further, the economic size of these countries is quite small relative to this disproportionate profit; their combined population is less than that of Spain or California.

Some have critiqued this particular data series. The data include "income from equity investments," some of which are counted more than once if there are tiers of ownership within the same country. Unfortunately, with existing data, it is not possible to account for this double-counting accurately. Still, one can use an alternative data series, also from the BEA, on direct investment earnings. This data series excludes all income from equity investments.[12] While eliminating the possibility of double-counting, this series is also incomplete, since income from investments is excluded.

Figure 1 also shows top countries in terms of this direct investment earnings series, and it shows a similar pattern as gross income. The same seven tax haven countries with low effective tax rates are in the top nine countries. Together, they account for 52 percent of all foreign direct investment earnings. In contrast, as shown in Figure 2, the top employment countries are all large economies with big markets. Effective tax rates are not particularly low for this set of countries; none have effective tax rates below 12 percent.

Regression analyses confirm these patterns. Table 1 presents an econometric analysis of the location of U.S. multinational firms' employment, sales, property plant and equipment, assets, gross income, and direct investment earnings. The data from the BEA surveys of U.S. multinational corporations cover the period 1983 to 2012. The scale of economic activity (employment, sales, plant/property/equipment, assets, and income) is modeled as depending on the size of the economy (measured by GDP), the average income of the population (measured by GDP per-capita), the distance between the country and the United States, and the effective tax rate paid by U.S. affiliates. In the top half of Table 1, employment and plant, property and equipment (PPE) do not show a statistically significant relationship with the effective tax rate, but sales, assets and — especially — income and earnings, are negatively related to effective tax rates.

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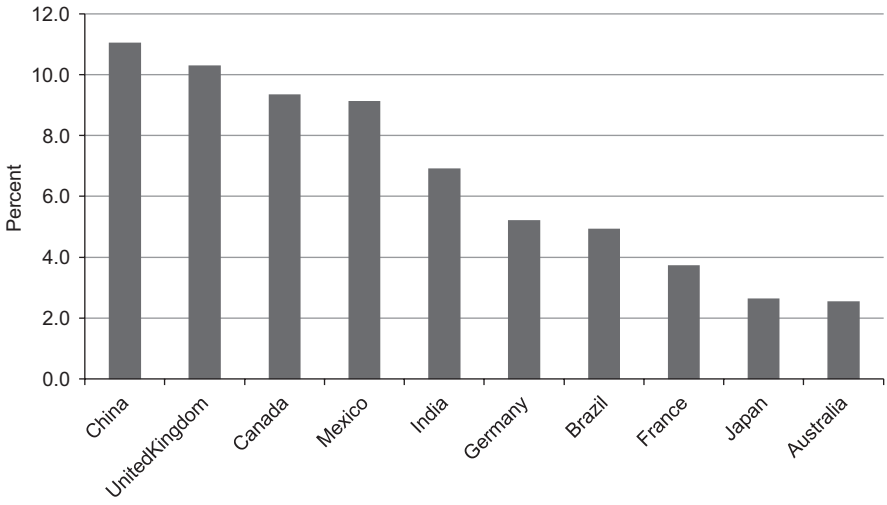
[11] The year 2012 is used since it is the most recent with publicly available (albeit preliminary) data. Other recent years display similar patterns.

[12] Also, direct investment earning data are pro-rated by the ownership share of U.S. parents, and the data are after-tax. In addition to these differences, there are other technical differences between the series.

Figure 2

Top Employment Countries, Affiliates of U.S. Multinational Firms, 2012
(Share of Total Employment, Percent)



Notes: None of the top 10 countries have effective tax rates under 12 percent in 2012.

The bottom half of Table 1 also includes country-specific fixed effects. Country fixed effects may be important, since country-specific influences are surely essential determinants of multinational firm activity, and econometric tests indicate that their inclusion is warranted. However, in these specifications, the relationships between effective tax rates and the dependent variables are estimated based solely on variation in tax rates *within* countries over time, since *between* country variation in tax rates (and other matters) are captured by the country-specific fixed effects. In these specifications, assets, income, and direct investment earnings continue to show large and statistically significant negative tax effects. For example, a 1 percentage point increase in the effective tax rate reduces gross income by 1.9 percent.

The evidence in these regressions is consistent with a long literature in the field of public finance that has emphasized a *hierarchy* of behavioral responses to taxation, whereby timing and financial decisions are more tax-sensitive then real decisions about levels of economic activity.[13] While some measures of economic activity are

[13] Saez, Slemrod, and Giertz (2012), Slemrod and Bakija (2008) and Auerbach and Slemrod (1997) summarize a vast body of research on taxation that suggests this hierarchy of behavioral responses.

Table 1

Regressions Explaining Activity Levels, 1983–2012

	(1) *ln(empl.)*	(2) *ln(sales)*	(3) *ln(PPE)*	(4) *ln(assets)*	(5) *ln(gross income)*	(6) *ln(d. inv. earn.)*
Panel A: Pooled Regressions						
Effective tax rate	0.0374	–1.412*	–0.264	–3.337*	–3.252*	–3.313*
	(0.237)	(0.246)	(0.255)	(0.277)	(0.263)	(0.253)
ln(GDP)	0.309*	0.326*	0.325*	0.319*	0.294*	0.231*
	(0.013)	(0.014)	(0.014)	(0.016)	(0.015)	(0.014)
ln(GDP per-capita)	–0.0600*	0.112*	0.0247	0.201*	0.162*	0.122*
	(0.0146)	(0.015)	(0.016)	(0.017)	(0.016)	(0.015)
ln(distance)	–0.0195	–0.00219	–0.0497	–0.0510	–0.0246	–0.180*
	(0.0406)	(0.0422)	(0.044)	(0.0475)	(0.0451)	(0.045)
N	1436	1439	1439	1439	1438	1370
R^2	0.31	0.30	0.27	0.33	0.31	0.29
Panel B: Fixed Effects Regressions						
Effective tax rate	–0.181	–0.0292	0.0119	–1.505**	–1.929*	–1.833*
	(0.102)	(0.102)	(0.147)	(0.168)	(0.170)	(0.175)
ln(GDP)	1.053*	2.393*	2.682*	3.237*	2.091*	1.278*
	(0.100)	(0.100)	(0.143)	(0.163)	(0.167)	(0.170)
ln(GDP per-capita)	–0.416*	–1.302*	–1.833*	–1.787*	–0.666*	–0.0422
	(0.123)	(0.123)	(0.176)	(0.201)	(0.205)	(0.208)
N	1436	1439	1439	1439	1438	1370
R^2(within)	0.48	0.76	0.57	0.72	0.66	0.57

Notes: Asterisks denote significance at the 5% (*) level. Standard errors are in parentheses. PPE stands for plant, property, and equipment. Gross income is net income plus foreign taxes paid.

not particularly tax sensitive, profits are very sensitive to tax rate differences across countries, as shown in Table 1.

B. Estimating the Revenue Consequences of Income Shifting Behavior

This section will use regression analysis and simple computations to estimate how U.S. government revenues are likely impacted by profit shifting activity. The analysis begins with regressions that relate affiliate profits to tax rates. The results from the regressions are used to calculate how the distribution of profits would differ absent tax rate differences among countries. Then some fraction of the lower foreign profits is attributed to the United States tax base.

The first step is a regression analysis to generate semi-elasticities between profits and tax rates of foreign countries. As always, there are some judgment calls involved in selecting the ideal elasticity for these calculations. Table 2 presents eight options for the reader to consider. These options come with tradeoffs; the top half of the table reports pooled specifications and the bottom half of the table reports fixed effects specifications. As discussed, country fixed effects are valuable since they allow investigators to control for unique country characteristics that may affect affiliate profitability. However, such specifications only consider variation in tax rates within countries over time, not employing the variation between countries in tax rates.

Likewise, the specifications in Columns (1) to (4) include different control variables: Column (2) includes macroeconomic controls, Column (3) includes controls that relate to the capital and labor use of affiliates in each country, and Column (4) includes both types of controls. While it may seem ideal to include as many control variables as possible, it is also possible that income shifting itself can affect the scale of employment and investment in plant, property, and equipment in each country, or even in the case of havens, affect GDP measurements. For instance, some real economic operations may be required in order to shift income, and the ability to shift income to low-tax destinations increases the attractiveness of such destinations as bases for real activity. Also, GDP figures for tax havens are likely to be distorted by profit shifting activity. Thus, including these controls may underestimate the tax-sensitivity of profits, if some of that sensitivity is captured by the control variables.

Nonetheless, the estimates of Table 2 all indicate large, negative, and statistically significant relationship between gross profits and effective tax rates.[14] The semi-elasticities range from –1.85 to –4.61, with an average estimate of –2.92. Estimated elasticities are quite similar if one instead uses data on the BEA direct investment earnings series. This average is in line with much of the prior literature on tax base elasticities, and it is similar to those found in the meta-analyses of de Mooij and Ederveen (2003, 2008) and de Mooij (2005).

[14] Effective tax rate differences between the foreign and U.S. country could also be used as an independent variable. If the U.S. effective tax rate is not changing over time, this will lead to identical estimates as those presented in this article.

Table 2

Regressions Estimating Gross Profits, 1983–2012

Panel A: Pooled Regressions	(1)	(2)	(3)	(4)
Effective tax rate	–2.709*	–3.252*	–3.496*	–2.980*
	(0.274)	(0.263)	(0.152)	(0.152)
ln(GDP)		0.294*		0.0288*
		(0.015)		(0.0102)
ln(GDP per-capita)		0.162*		0.123*
		(0.016)		(0.010)
ln(distance)		–0.0246		0.0223
		(0.0451)		(0.0260)
ln(PPE)			1.093*	1.000*
			(0.029)	(0.028)
ln(employ)			–0.318*	–0.215*
			(0.030)	(0.030)
N	1457	1438	1452	1433
R^2	0.06	0.31	0.73	0.77
Panel B: Fixed Effects Regressions				
Effective tax rate	–4.613*	–1.929*	–2.530*	–1.848*
	(0.237)	(0.170)	(0.166)	(0.154)
ln(GDP)		2.091*		0.777*
		(0.167)		(0.168)
ln(GDP per-capita)		–0.666*		0.146
		(0.205)		(0.191)
ln(PPE)			0.608*	0.373*
			(0.031)	(0.032)
ln(employ)			0.556*	0.299*
			(0.048)	(0.046)
N	1457	1438	1452	1433
R^2 (within)	0.21	0.66	0.65	0.72

Notes: Asterisks denote significance at the 5% (*) level. Standard errors are in parentheses. PPE stands for plant, property and equipment. Column (2) is the same as Column (5) in Table 1.

As noted above, Dowd, Landefeld, and Moore (2016) have argued that tax semi-elasticities are likely to be non-linear. Using the best possible data available, U.S. tax return data at the firm level, they find tax semi-elasticities of –4.7 at corporate tax rates of 5 percent and –0.7 at tax rates of 30 percent. Following Dowd, Landefeld, and Moore, I also ran specifications that allowed for a non-linear tax response, and I too found results that indicated higher elasticities at lower tax rates. Replacing the calculations below with calculations using nonlinear tax elasticities always raises the magnitude of my estimates of profit shifting. This is not surprising, since the majority of income is booked in countries with very low effective tax rates. Nonetheless, to err on the side of caution, I use linear elasticities — a consideration that strengthens the case for using a *higher* benchmark tax semi-elasticity.

As previously discussed, some studies using financial/Orbis data have found smaller elasticities, but one should also note that these studies are using data that neglect the very observations that are driving the profit shifting phenomenon, affiliates operating in tax havens. There is very little information on such operations in the financial databases.

This elasticity is then used to calculate what profits would be in the countries of operation of U.S. affiliates absent differences in tax rates between foreign countries and the United States. The United States has a statutory tax rate of 35 percent in most years of this analysis, though in this analysis, I assume that the U.S. effective tax rate would be 5 percentage points lower (30 percent in most years) and that this lower tax rate would apply to any increased income in the U.S. tax base.

Table 3 shows the major locations where income is shifted. In cases of high-tax rate countries with effective tax rates above my assumed U.S. rate (e.g., in 2012, Denmark, Argentina, Chile, Peru, India, Italy, Japan, and others), foreign profits would be higher in the counterfactual, but in many other cases, foreign profits would be lower. In 2012, it is estimated that profits in high-tax countries were "too low" (due to income shifting incentives) by $26 billion, profits in medium-tax (15–30 percent) countries were "too high" by $36 billion, and profits in the lowest tax countries (with effective tax rates less than 15 percent) were too high (due to tax incentives) by $595 billion. As these numbers clearly indicate, most of the profit shifting is done with respect to the lowest-tax countries, and this finding corresponds with the stylized facts described above.

Indeed, the estimates of excess income booked in just the seven important tax havens highlighted in Figure 1 account for 82 percent of all of the total. For the income booked in the Caymans ($41 billion), the Netherlands ($172 billion), Switzerland ($58 billion), Luxembourg ($96 billion), and Bermuda ($80 billion), this method suggests that profits absent income shifting incentives would instead be $9 billion in the Caymans, $33 billion in the Netherlands, $15 billion in Switzerland, $15 billion in Luxembourg, and $10 billion in Bermuda. As a comparison, profits booked in France and Germany are presently $13 billion and $17 billion, respectively.

Once these profit adjustments are made, a fraction (38.7 percent in 2012) of the hypothetically lower foreign profits (on aggregate) are attributed to the U.S. tax base. The assigned fraction is based on the share of intrafirm transactions that occur between

Table 3
Key Locations of Profit Shifting, 2012

Country	Gross Income Reported, $Billion	Estimate of Gross Income without Shifting, $Billion	Percent of Total Excess Income in Location
Netherlands	172.3	33.0	23.0
Ireland	122.3	23.6	16.3
Luxembourg	96.1	15.0	13.4
Bermuda	79.7	9.9	11.5
Switzerland	57.9	14.6	7.2
Singapore	42.4	10.5	5.3
UK (Caymans)	40.9	8.7	5.3
All others under 15 percent	188.6	89.8	16.3
Total under 15 percent	800	205	98.4
All others with data[1]	267	257	1.6

[1] Note that the total of gross income in 2012 ($1,219 billion) is larger than the income that is reported in particular countries analyzed here ($1,067 billion); some income is earned in "other" countries that are not designated.

affiliates abroad and the parent firm in the United States, relative to all intrafirm transactions undertaken by affiliates abroad (with both the parent and affiliates in other foreign countries). Thus, in 2012, foreign affiliates of U.S. parent multinational firms undertook 38.7 percent of their affiliated transactions with the United States; the remaining 61.3 percent were with other affiliated firms abroad. Of course, this fraction itself is just a plausible benchmark.

Finally, this number is scaled up, under the assumption that foreign multinational firms also engage in income shifting out of the United States. While the data do not allow a separate estimate of their profit shifting behavior, I assume that it would increase the revenue costs of income shifting by a factor that is based on the ratio of the sales of affiliates of foreign-based multinational firms in the United States (a proxy for the ability of foreign multinational firms to shift income away from the United States) to the sales of affiliates of U.S. based multinational firms abroad (a proxy for the ability of U.S. multinational firms to shift income away from the United States). Sources of underestimation and overestimation are discussed below.

Table 4 summarizes these estimates, including the main estimate using the BEA gross income series as well as an alternative estimate using the BEA direct investment earnings series. Column 2 shows the total income earned abroad by foreign affiliates of U.S. firms. Column 3 shows the estimated U.S. tax base increase if income shifting

Table 4
Estimates of Reduced Revenue due to Income Shifting, 2004–2012

Year	2. Total Reported Income/Earnings in Foreign Affiliates ($Billion)	3. Estimated Increased U.S. Tax Base without Income Shifting ($Billion)	4. Reduction in Revenue due to Income Shifting ($Billion)	5. Actual Corporate Tax Revenue, Federal Level ($Billion)
Panel A: Estimate Using Gross Income in Foreign Affiliates				
2004	525	148	–44	189
2008	925	257	–77	304
2012	1,219	371	–111	242
Panel B: Alternate Estimate Using Direct Investment Earnings Data				
2004	422	101	–30	189
2008	754	154	–46	304
2012	923	258	–77	242

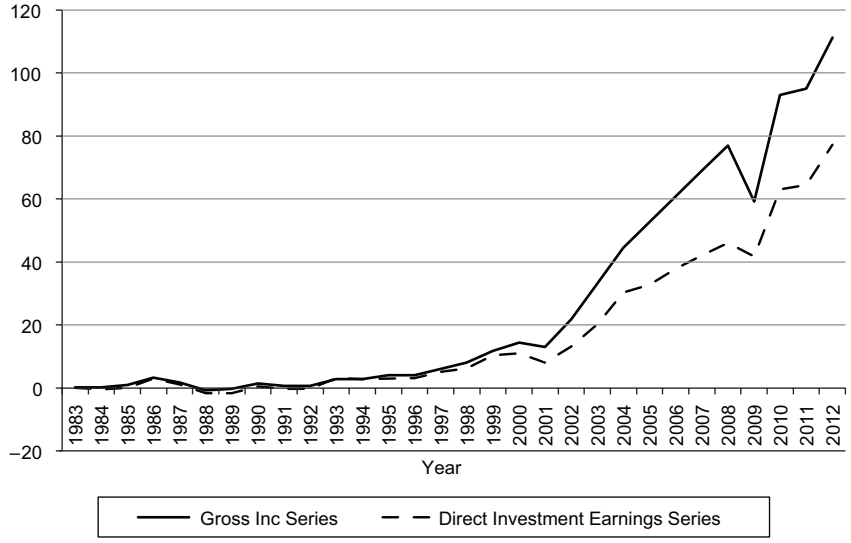
incentives were eliminated. Column 4 shows the reduction in U.S. corporate income tax revenues due to income shifting, assuming that marginal revenues are taxed at 30 percent; revenue estimates would of course be higher if one assumed that marginal additional profits would be taxed at the statutory rate. Column 5 shows actual corporate tax revenues in the corresponding year, as a comparison. By 2012, the revenue cost of income shifting behavior is estimated at $111 billion, about 45 percent of federal corporate tax revenue in 2012.

The alternative estimate uses the BEA direct investment earnings series. This series avoids double-counting, but also eliminates some types of income shifting. Column 2 indicates total direct investment earnings abroad over the period 2004–2012; data from the BEA are adjusted to include foreign taxes paid and to reverse the BEA's adjustment of the data by the U.S. parent equity ownership percentage. Column 3 shows the estimated increase in the U.S. tax base, again employing the methodology used for the main estimates. Using this series, the resulting revenue reduction estimates are lower, due to the combined effects of the elimination of double-counting and the omission of some types of income. Unfortunately, with available data, one cannot separate these two effects.

Figure 3 illustrates the changes in these estimates of revenue loss due to profit shifting over the period of the study, 1983 to 2012. The strong upward trend is not a reflection of increasing tax responsiveness in terms of the elasticity of the tax base with respect to a given tax rate difference, since that is assumed to be constant over this period. Instead, it is due to two factors. First, and most important, the total amount of foreign profits is increasing dramatically over this period. Income of all foreign affiliates was

Figure 3

Estimates of Revenue Loss due to Income Shifting ($Billion) (Estimates Using U.S. BEA Gross Income and Direct Investment Earnings Series)



$525 billion in 2004, and it grew to $1.2 trillion by 2012; direct investment earnings increased by similar magnitudes, more than doubling in eight years. Second, the average foreign effective tax rate has continued to fall over this time period, also contributing to income shifting incentives.

C. Sources of Uncertainty

There are several assumptions required for this analysis that generate uncertainty surrounding these estimates. Below, I enumerate the sources of uncertainty and discuss their possible effects on the estimates.

(1) The analysis begins with a regression of gross profits (net income plus foreign taxes) on effective tax rates. Eight specifications are presented, and all yield large semi-elasticities, between –1.85 and –4.61. I have chosen to present estimates based on a semi-elasticity of –2.92, the average of estimates presented in Table 2. This elasticity is also consistent with studies reviewed in de Mooij and Ederveen (2003, 2008) and de Mooij (2005). Allowing for non-linear responses, as suggested by the work of Dowd, Landefeld, and Moore (2016), would generate even larger estimates of profit shifting, due to larger elasticities applying to the bulk of the foreign income.

(2) The analysis assumes that, absent income shifting incentives, lower foreign profits would be earned, and a fraction of those profits would be earned instead in the United States. That fraction is calculated each year as the ratio of foreign affiliate sales to parent firms in the United States relative to foreign affiliate sales to both parents and affiliated firms in other countries. In 2012, this fraction was 38.7 percent. There is no particularly good reason to think that exactly this fraction of the excess income would be earned in the United States. However, in considering the potential to shift income, the terms and nature of intrafirm transactions provide one essential method for shifting income. Thus, the assumption here is that income would be shifted across destinations in proportion to these intrafirm transactions.[15]

(3) The final estimate is scaled up to account for the income shifting of foreign multinational firms. This is based on the ratio of the sales of affiliates of foreign-based multinational firms in the United States to the sales of affiliates of U.S. based multinational firms abroad. This is an arbitrary scaling that is based on a rough proxy for the ability of each type of multinational firm to shift income out of the U.S. tax base: in particular, the degree of their affiliated firm sales.[16] Still, there is some evidence that foreign multinationals are more able to use interest stripping to move income out of the U.S. tax base, one motive for recent corporate inversions (U.S. Department of the Treasury, 2007).

(4) There is some double-counting in the BEA gross income data of Table 4. These data include "income from equity investments," some of which are counted more than once if there are tiers of ownership within the same country. With existing data, it is not possible to account for this double-counting accurately. An alternative data series on direct investment earnings from the Bureau of Economic Analysis series excludes all income from equity investments, but this series is incomplete, since income from investments is not included. Table 4 also reports alternative estimates that are based on this series. The alternate estimates may understate the size of the profit-shifting problem due to some omitted income, but the first estimates may overstate the size of the problem due to some double-counting.

(5) This analysis assumes that the U.S. corporate tax rate that would apply to any increased tax base (typically 30 percent) is 5 percentage points lower than the statutory rate; likewise, it uses this lower rate when calculating the tax rate difference between the U.S. rate and the foreign effective tax rate. If the statutory rate were used instead, the calculated revenue losses would be higher. If a lower effective tax rate were used for the United States, the revenue losses would be lower. The analysis assumes that there

[15] This proxy could lead to an understatement of U.S. tax base erosion if, e.g., a U.S. parent transfers intellectual property to a foreign affiliate to shift profit out of the United States, and that transfer increases foreign-to-foreign affiliate transactions.

[16] For example, in 2012, affiliates of foreign-based multinational firms in the United States had $4.09 trillion in sales, and foreign affiliates of U.S. parents had $6.98 trillion in sales. So for 2012, that would suggest scaling up by 58.5 percent. This implies that affiliates of foreign-parent firms operating in the United States are generating slightly over a third of the total income shifting out of the U.S. tax base.

will be little residual tax collected by the United States on foreign income earned in low-tax jurisdictions; this assumption is consistent with the evidence on this question.[17]

(6) This analysis would not capture methods of tax avoidance that might reduce worldwide taxable income. For example, Mintz and Weichenrieder (2010) demonstrate how firms use indirect financing structures to avoid taxation by maximizing interest deductions. Kleinbard (2011a) also discusses the importance of "stateless" income, whereby firms create income that is not taxed in any jurisdiction. It is unclear how much of this income would appear in the BEA data.

In summary, item (1) is addressed by providing an average estimate based on different elasticities, but it generates a lower overall tax responsiveness than one would find allowing for non-linear responses to low-tax rate jurisdictions. Items (2), (3), and (5) have no clear direction of bias. Item (6) suggests that the estimates of Table 4 may be underestimates of the true size of the revenue costs of income shifting. Item (4) suggests that the first set of estimates of Table 4 may be an overestimate of the revenue costs of income shifting. However, an alternative estimate is also provided in this table, using a data series that likely provides an underestimate since it does not include all sources of income.

IV. A SPECULATIVE EXTENSION TO THE WORLD

As noted above, these estimates pertain only to the behavior of U.S. multinational firms. Nonetheless, the overall scale of the problem for the world at large can be approximated by relating these estimates to larger aggregates. While the precise magnitudes of the problem are likely unknowable, one can nonetheless approximate the scale of corporate base erosion and profit shifting for major countries.

Of course, a serious hurdle in scaling up the estimates for the United States is the absence of comparable publicly-available survey data for most countries. However, one can utilize data from the Forbes Global 2000 list of the world's largest corporations; these data indicate the location of corporate headquarters and the overall level of worldwide profits for the world's biggest corporations. Still, the present extension is limited by data constraints to the major countries that headquarter large multinational firms. Data on less developed countries are sparse.

Table 5 summarizes the major countries that headquarter the world's largest firms; 62 countries are home to the world's largest 2000 firms, but this fact masks even greater concentration, since 25 countries are home to 95 percent of the profits earned by this group of firms. Table 5 shows these countries, alongside their share of Global 2000 profits

[17] As Altshuler and Grubert (2013, p. 695) report, using 2006 data, only $32 billion is collected on *all* foreign source income, amounting to less than 4 percent of foreign income. "But the amount raised from dividends represents only a very small portion of this revenue. Indeed, if dividends are removed from taxable foreign income total U.S. tax revenue increases by about one billion. The dividends taxable on the margin after credits are more than offset by the credits originating with dividends that currently spill over to other income."

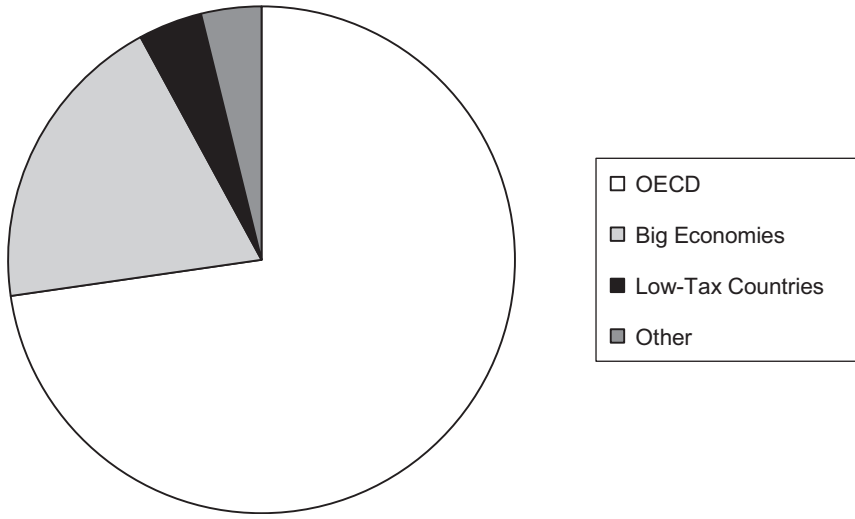
Table 5
Major Countries with Forbes Global 2000 Firms, 2012 Data

Country	Profit Share (of Global 2000 Total) (Percent)
Australia	2.82
Brazil	2.96
Canada	2.97
China	8.52
France	3.77
Germany	3.35
Hong Kong	3.22
India	2.29
Italy	1.29
Japan	5.41
Malaysia	0.50
Mexico	0.60
Netherlands	2.29
Norway	0.80
Russia	3.61
Saudi Arabia	0.77
Singapore	0.74
S. Africa	0.90
S. Korea	2.37
Spain	1.38
Sweden	1.04
Switzerland	2.51
Taiwan	0.94
United Kingdom	6.37
United States	33.33
25 Countries with share > 0.5 percent	94.75

in 2012. Figure 4 shows the distribution of the profits of Global 2000 firms, organized by headquarters country. Note that this does *not* show where profits are booked for tax purposes, merely the headquarters locations of the world's most profitable firms. The headquarters of 72 percent of the world's profits are in OECD countries, and 92 percent are headquartered in OECD countries and the other big economies that include Brazil,

Figure 4

Distribution of Forbes Global 2000 Firms Headquarters, 2012
(by Share of Worldwide Profits)



Notes: Profit shares refer to the *global* profits of these Forbes 2000 firms, by headquarters country, regardless of where the profits are ultimately booked. "Big Economies" include Brazil, China, India, Indonesia, Russia, Saudi Arabia, and South Africa. Low-tax countries include Bermuda, Caymans, Channel Islands, Cyprus, Hong Kong, and Singapore; Hong Kong and Singapore could also be classified as "big" economies. Other countries are generally small economies; they have individual shares of the worldwide total that always under half of 1 percent.

China, India, Indonesia, Russia, Saudi Arabia, and South Africa. Another 4 percent of world profits are headquartered in six major haven destinations: Bermuda, Caymans, Channel Islands, Cyprus, Hong Kong, and Singapore, although Singapore and Hong Kong could also be classified as big economies in their own right. Less than 4 percent of headquarters are in the other countries of the world.

I use this collection of countries to estimate the global scale of corporate tax base erosion. This estimation, while only indicative of approximate magnitudes, proceeds as follows.

First, since there are no detailed data on the location of affiliates of worldwide multinational firms, I assume that all multinational firms have affiliates in two types of countries: low-tax countries and high-tax countries. For example, for the United States in 2012, multinational firms report 1.2 billion in income abroad, of which $800 billion is booked in 17 low-tax countries. These are the countries that I consider destinations for artificial income shifting abroad. Not all of these countries are havens, but all have

effective tax rates that are less than 15 percent, which is the arbitrary cut-off that I use for low-tax countries.[18] As shown in Table 3, these countries are the destinations for 98 percent of the estimated profit shifting for United States multinational firms.

Second, for countries that are headquarters to Global 2000 firms, but that are not low-tax countries, I assume that their share of income booked in low-tax countries is proportionate to the share of U.S. multinational firm foreign income that is booked in low-tax countries. For example, since the United States headquarters 33.3 percent of the global profits of Global 2000 firms, and Germany headquarters about 3.3 percent of the global profits of Global 2000 firms, I assume that German multinational firms have about 10 percent of the U.S. level of profits in low-tax countries, or about $80 billion.[19]

Third, I assume that foreign country tax rates are 5 percentage points less than their statutory rates (inclusive of sub-federal taxation). For example, in the Japanese case, the statutory tax rate (including subfederal taxation) is 39.5 percent in 2012, so I assume a tax rate of 34.5 percent on corporate profits, allowing for some degree of tax base narrowing.[20]

Fourth, I model profit shifting between the higher-tax headquarters countries and the low-tax countries identified in the first step, which on average have an effective tax rate of 6.6 percent. I use this average tax rate to calculate the tax difference between the headquarters country and the low-tax countries, apply a semi-elasticity of 2.92 (as used above) with respect to tax rate differences, and then calculate the likely magnitude of profit shifting to low-tax countries. While this elasticity is based on the U.S. estimates above, it is a reasonable benchmark, since the focus here is solely on the subset of countries with very low tax rates, and tax elasticities with respect to foreign country tax rates are likely non-linear.[21]

Fifth, I use my estimates from the fourth step to create a global estimate of how much excess income is booked in low-tax countries. In the United States case, this method

[18] It is assumed here that Forbes Global 2000 firms are likely operating throughout the world, and have some operations in tax havens. This population of firms is used to estimate where major multinational firms are headquartered. Income shifting is then assumed to take place, away from higher-income countries and towards those with effective tax rates under 15 percent.

[19] This assumption is most reasonable if foreign headquartered multinational firms are similarly tax-responsive as their U.S. counterparts. However, there are some reasons to doubt that this will be the case in every instance. First, some countries have tax cultures that are more tax compliant than the U.S. culture. As an example, Japanese multinational firms are thought to be more dutiful in their attitude toward paying tax. Second, some countries have more stringent CFC laws than those in the United States, and this may reduce the incentive for multinational firms headquartered in such countries to shift profits abroad.

[20] Clearly, this assumption is arbitrary, and depends a great deal on provisions of particular country tax codes that create divergences between statutory and effective tax rates. Observers have noted that foreign tax bases are defined more broadly than the U.S. counterpart, but this varies by country.

[21] The non-linear elasticities suggested by Dowd, Landefeld, and Moore (2016) would suggest using a higher elasticity, since the average tax rate of the low-tax countries here is 6.6 percent, suggesting a semi-elasticity in excess of 4. If one instead employs a smaller elasticity of 2, one finds the total excess income in low-tax countries would be $739 billion, generating a revenue loss for the group of $192 billion. This can be compared with results in Table 6.

suggests that, of the $800 billion booked in the 17 low-tax countries, about $545 billion would not be booked in such countries absent the tax rate difference. For the group of big headquarters countries that are not low-tax countries, including the United States, the total is $1,076 billion.

Finally, the excess $1,076 billion is assigned to the tax bases of higher-tax headquarters countries based on their share of GDP for this higher-tax group of countries. For example, Germany has 6.3 percent of the higher-tax headquarters countries' total GDP, so they are assumed to recoup 6.3 percent of the $1,076 billion that is artificially in low-tax countries, as a higher German corporate tax base. The assumed German revenue gain is then the German effective tax rate (assumed to be 5 percentage points less than the statutory rate) multiplied by this additional tax base, or $17 billion.[22]

Under these calculations, the United States recoups 29 percent of the excess $1,076 booked in low tax countries, which assuming a 30 percent effective tax rate, generates a revenue loss due to profit shifting of $94 billion. Note that the United States result is different from those in Table 4, since it employs a different assumption about how excess income in low-tax countries would be booked in the counterfactual (that is based on GDP shares rather than affiliate transaction shares). The present analysis also employs a more aggregated estimate of income shifting, based on shifting between the home country and a group of 17 low-tax countries, whereas the analysis in Section III considered bilateral shifting incentives instead. Yet the estimate here is similar to those of Table 4, falling between the two estimates of $77 billion and $111 billion.

Table 6 shows the results of these calculations for other countries. While this analysis is more tentative than the analysis for the United States, it does give an approximate estimate of the magnitude of this problem for other countries without low tax rates. Overall, revenue loses total $279 billion for this group of countries, 20 percent of their total corporate tax revenues. This estimate is in line with the short run estimates of Crivelli, Keen, and de Mooij (2015).

Of course, the sources of uncertainty are larger than they are for the United States analysis, so these estimates should be viewed as merely indicative. Regarding the assumptions above, some are more straightforward than others. Key sources of uncertainty are discussed in footnotes accompanying each step.

I also provide an alternative estimate that uses a smaller tax semi-elasticity in footnote 21. To the extent that foreign multinational firms have a more compliant tax culture or more effective corporate tax base erosion protections, the alternative estimate may be

[22] In the analysis for the United States in Section III, I was able to assign a fraction of the excess income in havens to the United States based on the share of affiliate transactions that occur between the affiliate and the United States, relative to affiliates throughout the world. Here, since there are no comparable data for other countries, I simply assume that higher-tax countries would recoup lost tax base in proportion to their share of higher-tax country GDP. While this is an arbitrary assumption, it may be reasonable since corporate income may be proportionate to the size of the underlying economies that generate the income. That said, some of this excess income may belong in countries outside the sample, including less developed countries.

Table 6
Speculative Estimates of Corporate Tax Base Erosion, 2012

	Estimated Profits in 17 Low-Tax Countries ($Billion)	Assumed Tax Rate (Combined Statutory Rate – Percent) (Percent)	Excess Income Booked in Low-Tax Countries ($Billion)	Revenue Loss (Tax Rate × Share of Group GDP × $1,076 Billion) ($Billion)	Share of *all* Corporate Revenue, Including Subfederal (Percent)
Australia	67.7	25	36.3	7.4	9
Brazil	71.1	29	46.4	13.5	17
Chile	4.3	15	1.1	0.8	
China	204.5	20	79.7	32.7	11
Czech R.	1.9	14	0.4	0.6	8
Denmark	7.2	20	2.8	1.3	13
Finland	5.3	20	2.0	1.0	18
France	90.5	29	60.2	15.3	23
Germany	80.4	25	43.5	17.2	28
Greece	2.2	15	0.5	0.7	26
India	55.0	27	33.3	9.7	14
Indonesia	7.4	20	2.9	3.6	8
Italy	31.0	23	14.3	9.0	16
Japan	129.9	35	105.7	39.8	18
Mexico	14.4	25	7.7	5.7	
Norway	19.2	23	9.2	2.3	4
Poland	8.4	14	1.8	1.3	13
Portugal	8.2	27	4.7	1.1	19
Russia	86.7	15	21.1	5.8	7
S. Arabia	18.5	15	4.5	2.1	
S. Africa	21.6	25	11.3	1.9	9
S. Korea	56.9	19	20.8	4.5	10
Spain	33.1	25	17.7	6.6	24
Turkey	10.6	15	2.6	2.3	14
United States	800.2	30	545.3	93.8	26
Total	1,836		1,076	279	20.1

Notes: For countries other than the United States, the tax rate is the combined rate of federal and subfederal rates (when countries have sub-federal taxation); for the United States, I use the same assumption as the above analysis. Corporate tax revenue data are not available for all countries.

more appropriate.[23] Still, the Dowd, Landefeld, and Moore (2016) analysis suggests that higher tax elasticities may apply, since the income shifting is occurring with respect to very low-tax countries.

V. POLICY OPTIONS

A. The OECD/G20 BEPS Process

Both the prior literature and the present analysis indicate that profit shifting is likely eroding the corporate tax base in many countries. In response to pressing concerns about income shifting, as made clear by priority assigned to this issue in recent G8 and G20 meetings, the OECD undertook the BEPS project, where BEPS stands for base erosion and profit shifting. The OECD made a Herculean effort to develop concrete action plan recommendations to help countries address the problems of corporate profit shifting. The final BEPS project reports were issued in October 2015, totaling nearly 2,000 pages. These attempts to better connect taxable profits to economic activity are helpful, and the suggested measures are likely to incrementally curb profit shifting activity. The OECD/G20 process is commendable for pushing forward international cooperation in this area.

However, there are many reasons to suspect that profit shifting problems are not over. Country adoption of the proposals is likely to be uneven and incomplete, since the OECD recommendations are not binding. Also, fundamental problems will likely continue to vex policy-makers in years ahead. An essential difficulty lies in the problem of establishing the source of income for firms that are truly globally integrated. The very existence of multinational firms is testament to the fact that the global integration of business generates profit above and beyond what would be generated if domestic businesses merely interacted at arms' length. Since multinational firms earn more than their component parts would have earned alone, it is an arbitrary exercise to figure out where the additional profit should reside.

Modern notions of economic value also impede this exercise, as firms often generate value that is based on ideas and innovations that are truly intangible. The intangible nature of much intellectual property makes it even more difficult to establish the source of economic value.[24]

These conundrums are compounded by the fact that multinational firms have every incentive to redirect profits to low-tax locations through clever financial and accounting arrangements. The tax departments of major multinational firms are widely thought of as profit centers, and armies of accountants and lawyers work to develop innovative tax minimization strategies, often several steps ahead of government treasuries.

Thus, while there are many helpful parts of the OECD recommendations, including the steps toward country by country reporting, one wonders if the requisite political will

[23] Clausing (2015) reviews evidence on the comparative strength of foreign CFC laws.

[24] A particularly colorful description of this problem is found in O'Keefe, Brian and Marty Jones, "How Uber Plays the Tax Shell Game," *Fortune,* October 22, 2015, http://fortune.com/2015/10/22/uber-tax-shell/.

can be mustered to close the loopholes that enable pervasive profit shifting. It remains to be seen whether these efforts will be sufficient to reduce the problem substantially.

B. More Fundamental Reforms

1. Worldwide Consolidation

Under worldwide consolidation, discussed in Joint Committee on Taxation (JCT) (2011), and favored by Kleinbard (2011b) and Avi-Yonah (2013), a multinational firm would be required to consolidate the income earned across the parent firm and its affiliates, and all income would be taxed currently, allowing a credit for foreign taxes. JCT (2011, pp. 100–101) summarizes the approach as applied to the United States:

> The U.S. group would include on its return the foreign corporation's items of income, gain, deduction and loss, the character of such items would be preserved, and the foreign tax credit would be retained… under the consolidation approach, losses of foreign subsidiaries would be included on the U.S. return … the consolidation regime would apply only to U.S. corporate shareholders of foreign subsidiaries.

A worldwide consolidation approach has several benefits relative to the current system: there would be less tax-motivated shifting of economic activity or book income to low-tax locations, since such shifting would be less likely to affect a multinational firm's overall tax burden.[25] There would thus be fewer concerns about inefficient capital allocation or corporate tax base erosion. Also, there would be no "trapped cash" problem since income would be taxed currently.

However, depending in part on the corporate tax rate that would accompany this change, the proposal may raise competitiveness concerns for high-tax countries if firms would face rising foreign tax burdens under consolidation. Some also worry that this proposal would put stress on the definition of residence. Although some (e.g., Shaviro, 2011) have argued that residence is increasingly elective, others argue that relatively simple legislation would make it difficult to change residence for tax purposes. Governments could require that corporate residence indicate the true location of the "mind and management" of the firm; a similar UK definition of residence is deemed effective by both Avi-Yonah (2013) and Kleinbard (2011b). It is also feasible to develop anti-inversion measures along the lines of those suggested by Clausing (2014), Kleinbard (2014), or Shay (2014).

Finally, while there is little real-world experience with such a system, it still falls within international norms, since double taxation is prevented through foreign tax credits.

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[25] For firms with excess tax credits, there would still be an incentive to avoid earning income in high-tax countries and to earn income in low-tax countries. Excess tax credits are only likely if the average effective foreign income tax rate exceeds the residence country tax rate.

The proposal could be implemented without disadvantaging major trading partners, and it could be adopted unilaterally, though Avi-Yonah (2013) recommends that countries take a multilateral approach.

2. Formulary Apportionment

Under formulary apportionment, worldwide income would be assigned to individual countries based on a formula that reflects their real economic activities. Often, a three-factor formula is suggested (based on sales, assets, and payroll), but others, including Avi-Yonah and Clausing (2008), have suggested a single-factor formula based on the destination of sales.[26]

The essential advantage of the formulary approach is that it provides a concrete way for determining the source of international income that is not sensitive to arbitrary features of corporate behavior such as a firm's declared state of residence, their organizational structure, or their transfer pricing decisions. If a multinational firm changes these variables, it would not affect their tax burden under formulary apportionment.[27]

Importantly, the factors in the formula are real economic activities, not financial determinations. As noted above, Saez, Slemrod, and Giertz (2012), Slemrod and Bakija (2008), and Auerbach and Slemrod (1997) summarize a vast body of research on taxation that suggests that real economic decisions concerning employment or investment are far less responsive to taxation than are financial or accounting decisions. For multinational firms, this same pattern is clearly shown in the data analyzed in Table 1. There is no doubt that disproportionate amounts of income (compared to investment, sales, or employment) are booked in low-tax countries.

With a formulary approach, firms have no incentive to shift paper profits or to change their tax residence, since their tax liabilities are based on their real activities. However, concerns may remain. Under a three-factor formula, there is still an incentive to locate real economic activity in low-tax countries, which raises concerns regarding efficient capital allocation. This is somewhat less of a concern under a sales-based formula, since firms will still have an incentive to sell to customers in high-tax countries regardless.[28] Also, prior experience in the United States, which uses formulary apportionment to determine the corporate tax base of U.S. states, has indicated that formula factors (payroll, assets, and sales) are not particularly tax-sensitive.[29]

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[26] As an example, if a multinational company earned $1 billion worldwide, and had 30 percent of their payroll and assets in the United States, but 60 percent of their sales in the United States, their U.S. tax base would be $400 million under an equal weighted formula (((0.3+0.3+0.6)/3) × $1 billion), and $600 million under a single sales formula ((0.6) × $1 billion).

[27] This assumes that the multinational firm has a taxable presence (i.e., nexus) in the locations where it has employment, assets, and sales.

[28] This is particularly the case for final goods. For intermediate goods, this is more problematic.

[29] See Clausing (2016b) for an in-depth analysis of this question. Whether this tax-insensitivity would hold at higher corporate tax rates is an empirical question. Still, the forces of tax competition (mobility of production, competitive pricing, etc.) are likely stronger between U.S. states than between foreign countries.

If all countries were to adopt formulary apportionment, there would be few concerns about competitiveness. Multinational firms would be taxed based on their real economic activities (in terms of production and sales) in each country, so firms would be on an equal footing with other firms (based in different countries) that had similar local operations. If only some countries adopt formulary apportionment, competitive effects depend on the circumstances of particular firms.[30] Ideally, formulary apportionment would be adopted on a multilateral basis. However, if only some countries adopt, there are mechanisms that would encourage other countries to follow early adopters.[31]

Another related approach is to utilize a formulary profit-split method. The tax base would be calculated as a normal rate of return on expenses, with residual profits allocated by a sales-based formula. With careful implementation, such an approach might lessen concerns regarding tax competition under a formulary approach. Elsewhere, I provide more detail on the advantages and disadvantages of formulary approaches.[32]

VI. CONCLUSION

This paper undertakes a comprehensive analysis of corporate tax base erosion due to profit shifting. Using survey data from the Bureau of Economic Analysis, I find that profit shifting is likely to cost the U.S. government between $77 billion and $111 billion annually by 2012. The scale of the revenue loss is commensurate with several stylized facts about the size of the problem, including the large magnitudes of income booked in tax havens. In 2012, foreign affiliates of U.S. multinational firms booked $800 billion of income, or 75 percent of total foreign income, in countries with effective tax rates less than 15 percent; the average effective tax rate for these countries was 6.6 percent.[33]

Estimates of the revenue cost of income shifting are increasing over time. This trend reflects the increasing magnitude of profits booked in low-tax countries as well as continued corporate tax rate reductions abroad.

These estimates have the advantage of using comprehensive survey data that include operations in many tax haven countries, unlike many studies that rely on financial data. While all such estimates entail numerous assumptions, I have attempted to err on the side of caution in my assumptions, and I also provide alternative estimates.

In addition, using data on the Forbes Global 2000 list of the world's largest corporations, I provide a speculative extension of the estimates to other countries. I assume

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[30] This also generates the potential for double-taxation or double non-taxation, although that is also a problem under the present system.

[31] There is a natural incentive for countries to follow suit, as discussed in Avi-Yonah and Clausing (2008). In particular, once some countries adopt formulary apportionment, remaining separate accounting (SA) countries would lose tax base to formulary apportionment (FA) countries, since income can be shifted away from SA countries to FA countries without affecting tax burdens in FA locations (since they are based on a formula).

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

[33] This percentage is relative to the total income of countries with reported income, excluding income earned in "other countries" that are not designated.

that multinational firms based in other countries also shift income to low-tax destinations in proportion to the tax rate difference between the home market and the low-tax country group. Estimates indicate that profit shifting to low-tax countries may be costing headquarters countries without low tax rates approximately $280 billion annually, including revenue losses to the United States. These estimates entail several assumptions that are likely more speculative than those in the analysis for the United States. If foreign multinational firms are based in countries with tough tax base protections, or if these firms are simply less responsive to tax rate differences, that could lower these estimates.

Still, the world is larger than the set of countries that act as headquarters to major multinational firms, and other countries are ignored in this analysis, understating the scope of the profit shifting problem. Crivelli, Keen, and de Mooij (2015) discuss how profit shifting problems are likely to be especially pressing in less developed countries, relative to the size and affluence of their economies. Further, less developed countries are likely to have insufficient institutional capacity to handle the myriad enforcement difficulties associated with profit shifting behavior.

These concerns highlight the importance of policy action to address the problems associated with tax competition and corporate tax base erosion. The OECD/G20 BEPS process has promising elements, and it is a useful step forward. Still, we face essential difficulties in establishing the source of income in an increasingly global world economy. More fundamental reforms, such as worldwide consolidation or formulary apportionment, are likely to be more successful at stemming corporate tax base erosion in an era of globally integrated business and agile taxpayers.

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