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Note to readers: *This is an updated draft. 2017 data are employed for all tables. The paper referenced below – "Profit Shifting Before and After the Tax Cuts and Jobs Act" – was also updated in 2020:* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3274827. *That paper includes more extensive estimates of the magnitude of profit shifting; some material from this research note appears in Appendix A of that paper.*

How Big is Profit Shifting?

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Abstract: This research note describes the plausible magnitude of US revenue loss due to profit shifting, building on recent developments in the literature as well as new country-by-country data on US multinational companies in 2017. In the past, the most complete data sources have all shown large magnitudes of profit shifting, suggesting substantial revenue losses in non-haven countries. Blouin and Robinson (2019) have challenged this consensus, noting that many data sources may be flawed due to the inadvertent inclusion of double-counted profits or through an inadvertent misallocation of profit. Nonetheless, their proposed adjustment to the data generates its own puzzles, and experts at both the BEA and the JCT believe that the proposed adjustment will omit some types of profit shifting. Beyond that, Blouin and Robinson's conclusions regarding how their adjustments affect the scale of profit shifting set aside many nuances in method that affect bottom-line findings about the scale of profit shifting. This research note uses recently released country-by-country tax data to estimate plausible benchmarks regarding the scale of profit shifting, finding that profit shifting is likely to be costing the US government over $100 billion a year in 2017 (at 2017 tax rates). While much can be done to refine these estimates and learn more about the scale of the problem, the problem remains unambiguously very large.

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I. Introduction

There is a large discrepancy in the literature on profit shifting between sources that rely on financial accounting databases (such as Orbis and Compustat) and sources that rely on macroeconomic statistics, tax data, or survey data on multinational companies. Studies using the accounting databases find far smaller magnitudes of profit shifting and much lower elasticities than the other types of studies. Further, meta-analyses and literature surveys such as Heckemeyer and Overesch (2017) and Dharmapala (2014) that disproportionately rely on financial accounting database studies also minimize the magnitude of the profit shifting problem.[1]

There are several simple explanations for these discrepancies. While financial accounting databases are understandably very attractive to researchers since they allow the use of company-specific information, they come with crucial drawbacks. First, accounting databases such as Orbis and Compustat exclude most data on profits in havens from big multinational companies. Indeed, haven data can be nearly absent.[2] However, even a cursory look at *any* other data source on the country distribution of profits, including the recently released country-by-country database, shows very large amounts of income booked in haven countries. If you are missing haven income, you are missing the vast majority of the problem.

Second, a small number of very large multinational companies undertake the vast majority of all profit shifting, as shown by investigations by Wier and Reynolds (2018) and others. As Bilicka (2019) argues, there is reason to suspect that there are fixed costs associated with profit-shifting. This implies that large companies will be more willing to invest in the legal and financial expertise required to shift profits. Yet studies that treat each company observation equally may miss the fact that the tail of the distribution behaves differently from the average observation.

Third, as Dowd, Landefeld and Moore (2017) have persuasively argued, tax responsiveness is likely to be nonlinear, such that elasticities are highest with respect to haven countries. Dowd, Landefeld, and Moore employ US tax data, the best possible data for studying this question, finding large elasticities with respect to haven data. Indeed, nonlinear elasticities tend to fit the data better than linear ones. This makes intuitive sense. When shifting profits, surely it is best to aim for the lowest tax rate possible; shifting profits from a 30 percent country to a 20 percent country is less advantageous than moving profits toward havens with near-zero tax rates.

Due to the importance of tax havens, non-linear elasticities, and large, highly profitable companies, studies using accounting databases are likely to substantially underestimate the profit shifting problem. These studies are based on data that excludes almost all haven income, and studies also typically treat companies similarly irrespective of size.

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[1] This effect can be seen very clearly in Table 4 of Heckemeyer and Overesch (2017). Elasticities are far smaller for studies that employ financial accounting database data, and such studies dominate these surveys.

[2] This problem is documented by Tørsløv, Wier, and Zucman (2018) and discussed by OECD (2015), Dowd, Landefeld, and Moore (2017), and Clausing (2016, 2020). For example, Tørsløv, Wier, and Zucman (2018) report that $55.3 billion in consolidated profits are reported by Apple in 2016 in the Orbis dataset, yet only $2.0 billion show up in the subsidiary data in Orbis. Similarly large amounts of haven income are missing for other multinational companies.

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Recently, Blouin and Robinson (2019) suggest an additional reason for these differences in empirical magnitudes. In particular, they are concerned about flaws in researchers' interpretations of the data sources in the second sets of studies (using tax, survey, or macro data), due to the inadvertent inclusion of double-counted data or the misallocation of profits due to incorrect inferences about the location of profit in the presence of chains of ownership.

Double-counting has long been recognized (by myself and others) as a problem in one BEA series on foreign income: the net income series now found in Table IID1 of the multinational operations dataset. Double counting is *not* a problem in two other BEA data series: the direct investment income series, and the profit type return series. Nor is double-counting a problem in macroeconomic data, and it is unlikely to be a significant problem in tax data (5471), once dividend income is excluded. Whether double-counting is a problem in the US country by country data is unclear, but if there is double-counting, it does not appear to be a large problem.[3]

Nonetheless, Blouin and Robinson argue that a simple adjustment of the BEA net income series is possible, and comparing that series to the other series illustrates that other series may be misattributing too much income to low-tax countries, a result that they attribute to misunderstandings surrounding the equity method of accounting.

Yet there are other possible explanations for the differences between the adjusted data series of Blouin and Robinson and the other series they consider. These include differences of coverage, definitional differences, book/tax differences, and the possibility that their adjusted series does not include all profit shifting. In particular, the adjusted series determines where income is earned for accounting purposes, but it may not determine where income is booked for tax purposes. When income is shifted *among* foreign countries, the adjusted series may put too much of the income where it was earned rather than where it was taxed.[4]

In Section II, I discuss Blouin and Robinson's evidence suggesting that profit shifting may be smaller than we thought. While it is certainly important to acknowledge the limits of some data

[3] I omit stateless income from the analysis, which is a possible source of double counted income. Revenue is defined to exclude intracompany dividends, implying that profit should also exclude that source of income. Still, the definition of profit may be unclear, and companies are free to supply data as they see fit. Still, since the data are known to be used for transfer pricing risk assessment, it is unlikely that companies will have an incentive to overstate their income, especially in tax havens. Further, foreign totals are similar to those reported from other sources that are known to exclude double-counting.

See Horst and Curatolo (2020) for more on the possibility of double-counting in the stateless income data. Their analysis suggests a 14 percent discrepancy between country-by-country income totals (for both the United States and foreign countries) and totals in financial reports, when stateless income is excluded. There are several possible reasons for discrepancies, including the larger company coverage of the country-by-country data, the fact that reporting and definitional differences exist between the series, and the possibility that the country-by-country totals are overstated due to confusion about form 8975 directions. In the last event, it is possible that US income is overstated, which would not affect the current analysis, but it is also possible that some foreign lines may be mis-measured.

[4] There are also possible problems due to the possibility of hybrid dividends that may appear as a deductible payment for the high-tax originating affiliate but equity income for the low-tax receiving affiliate. It is unclear how the survey data would treat hybrid dividends, but they may be included as equity earnings in the low-tax receiving affiliate. In addition, many foreign earnings go entirely untaxed by foreign jurisdictions; Dyreng, Hills, and Markle (2019) have preliminary work that suggests that untaxed foreign earnings are both substantial and increasing, reaching $170 billion in 2017.

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series, the adjusted series suggested by Blouin and Robinson raises its own puzzles. For example, their adjusted series generates *negative* $10 billion in profit in Bermuda in 2017, and negative or very small profits in other recent years, despite the fact that country-by-country data show $634 billion in accumulated earnings in Bermuda, tens of billions of which was earned in 2017. Such puzzles are compatible with the view that the Blouin and Robinson adjustment excludes some foreign-to-foreign profit shifting.

Regardless of the limitations on these data series, there remain important questions about the true size of profit shifting. In Section III, I use new country-by-country data on US multinational operations in 2017 to consider this question. These data are new, but they may provide a more accurate measure of where US companies are booking their income. Using these data, I generate several back-of-the-envelope estimates of the scale of profit shifting. These estimates indicate that profit shifting remains a large revenue problem for the United States, resulting in large revenue losses.

These findings are compatible with stylized facts about the size of the profit shifting problem as well as other recent literature in this area. Aside from studies that rely on accounting databases that omit most haven income, studies are nearly uniform in suggesting the large scale of the profit shifting problem. These findings also comport with the $4.2 trillion in offshore earnings visible in the US country-by-country data, $3.0 trillion of which is in known havens or countries with effective tax rates below 10 percent.[5]

In the end, more work needs to be done to unpack the sources of differences between data series regarding the magnitude of offshore profits. The release of additional country-by-country data may also help resolve puzzles; so far, we only have one complete year of data from the United States. While future work will help clarify the scale of profit shifting, it is undoubtedly a very large problem.

II. Is profit shifting smaller than we thought?

In a recent working paper, Blouin and Robinson (2019) argue that prior studies have vastly overstated the problem of profit shifting by inadvertently using data that include some double-counting of foreign profits. There are three elements to their critique.

First, it was long known that one BEA series from their surveys of US multinational companies included double-counting due to chains of ownership. For example, if profit was earned in Germany, and then shifted to two havens (or even among multiple affiliates in the same jurisdiction), the BEA "net income" series from the income statement (now table IID1) would show the income multiple times. Therefore, researchers should not rely on these unadjusted data to measure the extent of profit shifting. This is particularly the case in recent years, since the degree of indirect ownership has become quite large. For example, in 2017, this series would show about $1.3 trillion in foreign income (after tax), whereas the direct investment income

[5] This calculation (of 2.97 trillion) is based on the country-by-country dataset from 2017, counting the following tax haven economies. The largest nine account for $2.83 trillion and are: Bermuda, Caymans, Ireland, Jersey Luxembourg, the Netherlands, Puerto Rico, Singapore, Switzerland. Others include Barbados, the British Virgin Islands, Gibraltar, Isle of Man, Macau, Mauritius, St. Kitts and Nevis, and St. Lucia.

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series (after tax) would show only about $471 billion. The direct investment income series includes no double-counting.

Researchers have long understood this problem. For example, in Clausing (2016), while I report estimates using this series, I also employ the direct investment income series and caution that the net income series can include double-counting. (Unfortunately, removing the double-counting from the net income series without eliminating some types of profit shifting is difficult, as discussed below.) In more recent work, Clausing (2020), I don't even report the series with double-counting. Instead, I rely on the direct investment income series from the balance of payments; these data do not include double-counting.

Second, Blouin and Robinson argue that there is a simple way to adjust for the double-counting in the "net income" series data; one can simply subtract the equity income from the main income series of the income statement. Note that their method affects both the measure of income (lowering it) and also the measure of the effective tax rate (raising it), since income is in the denominator of the effective tax rate.

However, for more than a decade, economists at the BEA have reported that there was no simple correction for the double-counting (for the purpose of calculating profit shifting), because the adjustment suggested by Blouin and Robinson would remove not just the double-counting, but also undo some foreign-to-foreign profit shifting in the data. Thus, if income were shifted from Germany to Bermuda for tax purposes, the Blouin and Robinson method may show the income nonetheless in Germany. This may suit some research questions, such as determining where income was "earned" for accounting purposes, but it does not provide a good estimate of revenue loss from profit shifting, since we are concerned instead with where the income is reported for tax purposes. Thus, if it is shifted from Germany to Bermuda to avoid tax, we should count the income in Bermuda for an estimate of profit shifting, not in Germany.

There are possible problems due to hybrid dividends that may appear as a deductible payment for the high-tax originating affiliate but equity income for the low-tax receiving affiliate. It is unclear how the survey data would treat hybrid dividends, but they may be included as equity earnings in the low-tax receiving affiliate. Sorting out where untaxed income should be located is also important. As Dyreng, Hills, and Markle (2019) show, many foreign earnings go entirely untaxed by foreign jurisdictions; their preliminary work suggests that untaxed foreign earnings are both substantial and increasing, reaching $170 billion in 2017.

Like the Blouin and Robinson adjusted method, similar issues affect the BEA series on "profit type return." The "profit type return" series will not capture all foreign-to-foreign profit shifting. Thus, while it may be suitable for some research questions, it is not suitable for estimating the overall size of profit shifting, since foreign to foreign profit shifting is quantitatively important.

Why not simply focus on US-foreign profit shifting? For my methods, it is not suitable. In my studies of profit shifting magnitudes, I do not attribute all of the calculated "excess" income earned by US multinational companies in tax havens back to the United States; instead, some fraction of that income is assigned to other non-haven countries, acknowledging the importance

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of profit shifting between foreign countries. Therefore, while the adjusted series is useful for some purposes, it is not useful for my research question.

Unfortunately, Blouin and Robinson's use of this adjusted series influences all of their comparisons with other data sources and methods. If their series does not reflect the magnitude of foreign-to-foreign profit shifting, then is not a useful benchmark to judge other studies and series. Moreover, these series also differ for other reasons, including differences in coverage, definitional differences, and financial accounting/tax differences.

Ultimately, in recent work, I have chosen to rely on neither "profit type return" (which may omit foreign to foreign shifting) nor the "net income" BEA series (that includes double counting). Instead, I've employed the direct investment income series. The direct investment earnings series is the best BEA series for considering the scope and scale of profit shifting at present, since the other series either double-count income or miss foreign-to-foreign profit shifting.

Third, I am grateful to Blouin and Robinson for pointing out a problem with the correction that I used to analyze the direct investment income series. Fixing this problem lowered my estimate of the size of profit-shifting, but the remaining profit shifting remains greater than that implied in Blouin and Robinson. The following box gives full details.

> Box: **Clausing (2016, 2020) Studies**. In these papers, I use the BEA direct investment income series, which does not suffer from double-counting. This series does not include all foreign income earned by the US multinational company; rather, it adjusts the total by the US ownership percentage. Since I was interested in the *total* income earned by the multinational company abroad, not just the US-owned share, I attempted to reverse this adjustment, using data provided by the BEA.
>
> However, my attempt to adjust these data may have introduced a source of error that will over-adjust income upwards, in the presence of chains of ownership. Therefore, I have revised Clausing (2020), and I now rely on the original direct investment income series, without this adjustment. That lowered estimates from the first draft (which appeared in 2019), and it will also include a built-in source of underestimation, since any foreign-owned portion of the US multinational income will be excluded from the analysis. However, using publicly available data, there is no way to make that adjustment cleanly.
>
> Still, relative to the replication of Clausing (2016) in Blouin and Robinson (2019), after removing my erroneous adjustment, the new numbers remain far higher than those reported in Blouin and Robinson. Even if we take their adjusted series at face value, which itself is not warranted due to missing foreign-to-foreign shifting in the data, other adjustments in method between Clausing (2016) and Clausing (2020) would substantially raise the numbers relative to Blouin and Robinson.
>
> First, Clausing (2016) relied on affiliate sales ratios to reassign some fraction of excess profits in low-tax countries back to the United States, assigning well under 40 percent of haven profit back to the United States in recent years. However, those data are themselves distorted by profit shifting incentives, so in more recent work, I've relied on

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averages of economic activity (including total sales as well as factors such as employment and payroll) to assign profits back to the United States, assigning about two-thirds of haven profit back to the United States.

Second, in Clausing (2020), I employ non-linear elasticities, following the insightful work of Dowd, Landefeld, and Moore (2017). Even a cursory inspection of the data shows that tax response elasticities are likely particularly large with respect to the haven countries with the lowest tax rates. There are clearly disproportionate foreign earnings booked in just a handful of havens. Thus, nonlinear elasticities are likely appropriate.

Readers can consult Clausing (2020) to compare estimates of profit shifting from the Blouin-Robinson adjusted series, the direct investment income series, and the country by country series. All estimates indicate large magnitudes of revenue loss due to profit shifting, but there is a wide range of possible estimates, depending on method and data series.

Finally, it is important to note that the direct investment income series does not match the series generated by Blouin and Robinson's adjustment method. As the analysis below suggests, these differences may be due to omitting foreign-to-foreign profit shifting in their method. However, Blouin and Robinson attribute the difference to income misattribution in the direct investment income series.

Income misattribution is possible in the direct investment income series, since income is counted as originating in the "last" country before the flow to the United States, which may be different from the country where income was earned for accounting purposes or reported for tax purposes. However, while it is possible that the tax rates of the countries in which direct investment income is shown are systematically different from those where the income was reported for tax purposes, comparison with the adjusted series will not clarify that issue, as the adjusted series eliminates some foreign-to-foreign shifting and therefore assigns too much income to higher-tax foreign countries instead of havens.

At present, I have no reason to suspect that the tax rates in the "last" countries are systematically different from the tax rates in the countries in which the income was reported for tax purposes. In fact, it would seem odd if companies were routing income through tax havens, while actually paying the tax in a prior higher income country.

The Adjusted Net Income Method

As discussed, Blouin and Robinson adjust the BEA "net income" series data. When BEA economists corresponded with the authors and myself during the summer and fall of 2019, there remained disagreement regarding whether the Blouin and Robinson adjustment inadvertently eliminated some foreign-to-foreign shifting. The BEA economists maintain that they do eliminate some foreign-to-foreign shifting, and the data below also support that possibility.

Still, it is possible that some of the disagreement is due to terminology. Blouin and Robinson's series will show us where income is earned from an accounting perspective. However, the costs

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of profit shifting are generated by deviations between where income is truly earned and where it is reported for tax purposes. And indeed, substantial amounts of foreign income go untaxed in any foreign jurisdiction. In related work, Bilicka (2019) shows that there are many instances where companies report zero taxable profits in combination with positive accounting profits.

Regardless, is useful to compare their adjusted series to data from other sources, in order to consider the full implications of that method.

In Table 1, the adjusted series yields less income in tax havens than the direct investment earnings series; haven income is also low relative to the country-by-country data. For example, income in Bermuda is negative in 2017 using the adjusted series, which conflicts with the tens of billions of dollars reported in Bermuda in 2017 by the other sources in Table 1. These puzzles are compatible with the view that the adjusted series does not include all foreign-to-foreign profit shifting.

Table 1: Foreign Profits, in millions, 2017

	BR Adjusted Series	BEA Balance of Payments Direct Investment Income		IRS Country-by-country Data (income series are before tax)		
	Net inc.+ for. tax-equity inc.	after tax (reported)	before tax (calculated)[6]	Full Sample	Positive Profit	Accumulated Earnings
All countries[7]	571,007	470,933	574,958	638,467	873,621	4,240,635
Stateless (omitted from totals and subtotals)				203,571	215,170	690,583
Puerto Rico				34,335	35,236	114,439
Ireland	82,519	51,804	55,930	29,478	34,221	103,961
Luxembourg	6,484	36,825	38,734	24,866	60,438	357,328
Netherlands	58,676	76,083	81,120	40,010	69,964	461,814
Switzerland	37,696	30,474	34,332	49,376	59,204	374,797
Bermuda	-10,431	32,341	33,215	32,476	35,433	634,413
UK Caymans[8]	20,675	33,235	33,888	58,540	62,369	142,467
Singapore	35,270	24,496	27,529	54,642	56,788	174,888
Big Haven Total[9]	230,889	285,258	304,748	323,723	413,653	2,364,107
Big Haven Share	40%		53%	51%	47%	56%

[6] This calculation adds back foreign taxes paid from the income statement to the direct investment earnings series. There may be imperfect country matching if direct investment income is distributed across countries differently from net income, but it gives plausible relative magnitudes, especially for the totals.
[7] This total excludes stateless income, as does the big haven total.
[8] BEA data lists as "UK Caribbean Islands" but other sources list as Caymans.
[9] Big havens include only those listed above, although the country by country data reveal many other small havens. In the 2017 data, Jersey emerges as a big haven with $461 billion in accumulated profits; however, I do not include Jersey in the big haven share.

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Further, important puzzles arise when trying to reconcile the adjusted series with the large stocks of accumulated earnings reported by companies in the 2017 country by country data series. These puzzles are illustrated in Table 2. Over the period 2008-2017, the adjusted series indicates a total of $51 billion booked in Bermuda, whereas direct investment earnings data indicate a total of $264 billion, a quantity more consistent with a stock of $634 billion in accumulated earnings.[10] Similar puzzles exist for several other haven countries.

Table 2: Earnings Over 2008-2017 and Accumulated Earnings in 2017

	BEA Data: Adjusted Series (2008-2017)	BEA Data: Direct Inv Income[11] (2008-2017)	IRS Country-by-country Data: Accumulated Earnings (2017)
All Foreign	3,872,920	4,485,765	4,240,635
Seven Havens	1,243,257	2,052,438	2,249,668
of which, Bermuda	51,092	263,871	634,413
Seven Haven Share	32.1%	45.8%	53.1%

Note: The seven havens include Bermuda, Caymans, Ireland, Luxembourg, Netherlands, Singapore, and Switzerland. For the BEA data, 2009 and 2014 are excluded since some haven countries are missing data for those years; those columns report only the eight years with complete data.

For the seven havens shown above (excluding Puerto Rico as well as other havens), accumulated earnings data show $2.25 trillion, excluding stateless income. Totaling up direct investment earnings for these countries over the prior years shows $2.05 trillion, and the adjusted series yields $1.24 trillion. Thus, a close inspection of the country-by-country data indicates important discrepancies between the adjusted series totals and plausible magnitudes of income reported in key tax havens, a finding that is consistent with the absence of some foreign to foreign profit shifting in the adjusted series.

Other Data Sources

There are also other choices of data sources. The BEA "profit type return" series is a closer match to the adjusted series. It does not include equity income, and according to BEA economists, it also misses some profit shifting among foreign affiliates of US multinational companies. This series shows $530 billion in foreign profits in 2017, somewhat less than what the adjusted series generates. Both series show large amounts of *negative* income for Bermuda in 2017, despite country-by-country data that indicate tens of billions of profit.

Treasury data also show profits for controlled foreign corporations. In 2014, the most recent year released, the data indicate $648 billion in foreign profits.[12] That figure indicates profits before tax and after subtracting dividend income. These data also include some foreign-owned controlled foreign corporations and do not have size cutoffs, so they should generate larger totals than the BEA series examined above. On the other hand, unlike BEA data, they only include

[10] None of these numbers have been adjusted for growth in invested earnings.
[11] Data are again calculated to be before-tax, to ease comparison to the adjusted series.
[12] In 2014, comparable totals for the adjusted series yield $580 billion in foreign income and the direct investment series shows $457 billion in after-tax income or $590 billion in calculated before-tax income.

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corporations, which may lower the totals. Finally, these data are based on tax information rather than accounting information, so that may influence the relative magnitudes of the series. Unfortunately, data for 2016 are not yet released (as of this writing).

One theme with all of these data sources is that none of them are quite perfect. Garcia-Bernando, Jansky, and Tørsløv (2019) discuss each data source in great detail. Nevertheless, some series are better than others. Accounting databases such as Compustat and Orbis are nearly useless for many questions that concern profit shifting, since they do not report most haven income, and profit shifting to tax havens comprises the vast majority of the profit-shifting problem. The regular income series of the BEA includes income that has been counted multiple times, and it should not be used without adjustment.

Blouin and Robinson's adjusted series, and the profit-type return series from the BEA, do not include double-counting, but they do appear to omit some foreign to foreign profit shifting.

The balance of payments data on foreign direct investment income do not have double-counting problems, but we are not sure that the location from which the income flowed to the United States is the same location where the profit was reported for tax purposes.

And, all of these aggregate data sources combine companies with losses with those with profits, risking an overestimation of the relevant effective tax rates (and an underestimation of total profit). The tax payments in the numerator are typically made by profit-earning companies, but the income denominator is too low due to the inclusion of companies with losses.

Finally, as a result of recent international tax initiatives, companies are now required to file "country-by-country" reports to tax authorities. These reports were voluntary in the United States in 2016, so 2017 is the first year with complete data. These data may be a promising source for revealing the location of companies' profits and economic activities, especially once they are released on a more international basis. The following section will consider the plausible degree of US multinational company profit shifting activity, focusing solely on this data source. Readers are referred to Clausing (2020) for a comparison of these estimates with other series, including the direct investment income series and the adjusted series.

III. How Big was US Multinational Company Profit Shifting in 2017?

A. <u>The US Country-by-country Data</u>

Simple calculations from the IRS release of the first complete year of country-by-country (form 8975) data help shed light on the scale of profit shifting by US multinational companies in 2017.

These data have several advantages: companies should have an incentive to avoid double-counting income or overstating income in havens, the data should identify where companies are recording profit and paying taxes across countries, and they should include the vast majority of US multinational companies that are engaged in profit shifting. The data are intended to be used for transfer pricing risk assessment, in part by allowing an observation of differences between where income is located for tax purposes and where real economic activities are occurring.

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Given their purpose, these data should also be quite useful for estimating plausible magnitudes of profit shifting.

Although only large companies are required to submit this information, profit shifting is mostly confined to the largest companies. Larger companies have the accounting and legal expertise required to shift profits; such companies also account for the vast majority of all foreign operations.

There are also some uncertainties regarding these data, some of which may lead to systematic sources of underestimation (or, less likely, overestimation).

1. There is some income that is recorded as "stateless" on the form. For now, I completely omit this income. There is ample evidence that stateless income creation is a large part of the profit shifting problem, and some of this reported income likely reflects true stateless income planning. Indeed, substantial and increasing amounts of foreign income go untaxed in any foreign jurisdiction. However, other parts of that income may be capturing types of income that should be characterized as United States or other foreign country income. Thus, to avoid possible double-counting, I omit this income. As we learn more about the data, it may be appropriate to also include some stateless income in estimates of profit shifting.
2. We have only one year of data, and that makes drawing larger inferences more difficult.
3. Whether double-counting is a problem in the US country by country data is unclear, but if there is double-counting, it does not appear to be a large problem. Revenue is defined to exclude intracompany dividends, implying that profit should also exclude that source of income. Still, the definition of profit may have originally been unclear, and in December 2019, the OECD issued updated guidelines clarifying that intracompany dividends should not be included in income. Since the data are known to be used for transfer pricing risk assessment, it is unlikely that companies will have an incentive to overstate their income, especially in tax havens. Also, foreign totals are similar to those reported from other sources that are known to exclude double-counting. See footnote 3 for more on this issue.
4. It is unclear whether to analyze the full sample, or the sample of companies that show positive profits. The latter sample should be a better indication of the true effective tax rates of companies earning profits and the true revenue consequences of profit shifting for such companies in that particular year. The full sample would bias upward foreign effective tax rates (since losses are included in the denominator) and bias downward profits. Still, including companies with losses should provide a good lower-bound estimate. (If all companies experience periods with losses and periods with profits, over time their profitability should reflect the sample as a whole. However, if the same companies consistently earn profits while another set of companies consistently earn losses, then focusing on those companies with profits would be better.) These two series may thus provide upper and lower bounds of the scale of profit shifting.
5. These data only indicate the profit shifting of US multinational companies, and foreign-based multinational companies are also likely to shift profit out of the United States tax base. Thus, the revenue cost of profit-shifting should be scaled up to reflect that fact.

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In the following analysis, I report three sets of calculations indicating the scale of US multinational company profit shifting using both data sets: the overall set of companies and the positive profit companies.

B. Plausible Estimates from US Country-by-Country Data (All Company Sample)

In the first method, I simply calculate how much revenue the US government would have raised if it implemented a country-by-country minimum tax at the US statutory rate of 35 percent (in 2017). Of course, this is not a profit shifting estimate, since it blends ordinary and shifted profits for any country with a lower effective tax rate than the United States. Still, it is a good starting point for examining the data, and it also provides policy-relevant conclusions regarding the possible adoption of a country-by-country minimum tax.[13]

For each country with a tax rate less than the US rate, the minimum tax applies at the difference between the US rate and foreign effective tax rate. In the full sample, the foreign effective tax rate is likely reported as too high since the income in the denominator includes both companies with profits and those with losses, whereas taxes paid in the numerator are presumably paid mostly by those companies with profits. Despite this (and other) sources of underestimation, the calculations indicate about over $130 billion in revenue from a per-country minimum tax.

Two adjustments of this estimate may be useful. First, some of this revenue would likely end up in foreign country tax bases. In general, some of the income earned in havens does not truly "belong" in the United States, due to the importance of profit shifting among foreign countries. (US companies may move profit from Germany to Bermuda, as one example.) The US share of all real activity by US multinationals (the average of employment, assets, and sales) is about two-thirds, so one might usefully scale down the above number to reflect reduced foreign-to-foreign shifting under such a policy.[14] That would imply a US revenue gain of $89 billion, with foreign tax bases gaining the remainder of the revenue as increased corporate tax base. In the United States, some of the revenue would also show up as increased corporate tax base rather than minimum tax revenue, due to the reduction in profit-shifting as the incentive to shift profits is removed.

Because of cross-crediting under the prior US tax system in effect in 2017, this estimate is larger than the revenue cost of deferral, since companies could use tax credits from higher-tax countries to offset tax due on income earned in low tax countries. Nonetheless, as of 2014, the US Joint Committee on Taxation (JCT) calculated the revenue cost of deferral at about $80 billion per year, using the best tax data available on multinational companies.

Second, that number represents only the activities of US multinational companies, and foreign multinational companies also engage in profit shifting. That consideration might suggest scaling

[13] In fact, two Presidential candidates have suggested a 35 percent per-country minimum tax. Still, given the large departure from current and prior law, implementation of per-country tax at such a high level is very unlikely. Clausing (2020) provides estimates for lower per-country minimum taxes in Appendix E.

[14] That said, those real activity numbers may themselves be distorted by profit shifting, which could lead to an underestimate of the true US share of offshore profits in this adjustment.

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up such a number, if one is also interested in targeting the profit shifting of foreign multinationals. A country-by-country minimum tax would not target such companies, but Saez and Zucman (2019) have suggested a policy that does. Tackling the profit shifting of foreign multinational companies was also a key motive between the recently enacted BEAT (base erosion anti-abuse tax), included as part of the 2017 Tax Act.

Beyond these adjustments, an important conceptual problem concerns the fact that some income is truly earned in low-tax countries, whereas other income is merely shifted there for tax purposes (and would have otherwise been reported elsewhere). Separating these two types of income is difficult. However, it is useful to note that over 70 percent of the revenue from the simulated minimum tax comes from just a small handful of havens (Bermuda, the Caymans, Ireland, Luxembourg, Netherlands, Puerto Rico, Singapore, and Switzerland).

Still, a second method attempts to identify profit shifting by considering the discrepancy between the real and financial activities of US multinational companies. The method is quite simple. For each jurisdiction with an effective tax rate below 10 percent, I ask how much less profit would be earned if the jurisdiction instead reported the same profit per employee as US multinational companies report for all countries, about $50,500 in 2017.[15] For example, profit per worker in Singapore is $337,000. If there were instead $50,500 of profit per worker, that would imply over $46 billion less earned in Singapore. Even focusing only on the lowest tax countries, that method indicates $274 billion in excess profits in haven countries, which implies a revenue pick up of about $96 billion at the 2017 US statutory rate. In the full sample, these totals exclude Ireland and the Netherlands since they miss the ten percent cutoff. More generally, this is likely to be a low estimate since it ignores any excess profits in countries with effective tax rates over ten percent.

A third method uses an assumed tax rate semi-elasticity of 3 to calculate counterfactual profits, based on analysis from Clausing (2020); this benchmark elasticity is smaller than elasticities calculated from cross-sections of this particular data set, and it is smaller than elasticities calculated based on other series using panel data and country-specific fixed effects.[16] Further, nonlinear elasticities are likely appropriate, as persuasively argued by Dowd, Landefeld, and Moore (2017).[17] Using nonlinear elasticities would lead to larger estimates, and it would improve the explanatory fit of the regression. However, for simplicity, and to err on the side of caution given the limits of analyzing one year of data, I simply use a linear elasticity estimate.

[15] Stateless income is excluded from this total. Tørsløv, Zucman, and Wier (2018) focus on profit to wage ratios in their assessment of profit shifting magnitudes.

[16] Using the country by country data set, and employing a regression that relates the natural log of profits to (log) employment, (log) assets, and the tax rate, would generate an elasticity of 4.7. Using BEA direct investment earnings data, one can also calculate a benchmark elasticity based on panel data. The benchmark used here is slightly below that found in my preferred specification (3.2), which regresses the natural log of direct investment income on the effective tax rate, log employment, log employee compensation, and log assets, controlling for country-specific fixed effects. If readers prefer other elasticities, they can scale estimates up and down accordingly with simple multiplication.

[17] This nonlinearity is quite visible to anyone who looks closely at these data; most foreign profits are concentrated in the lowest tax countries. The country-by-country data show 56% of accumulated profits in just a handful of haven countries.

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Such elasticities are used to eliminate the tax responsiveness of profits, controlling for other factors that affect profits, including both the scale of economic activity across different countries (measured by affiliate employment and sales) and (when possible) country-specific factors (using country fixed effects). The sample is limited to jurisdictions with tax rates between zero and 50 percent. (Losses and small idiosyncratic instances can otherwise generate outlier tax rates.) That tax responsiveness is then used to calculate counterfactual profits abroad, following the method of my prior work in Clausing (2016, 2020). The simulated change in profits in havens if capped at the current profits in such countries, as in prior work. Thus, there is no change in the overall amount of profits under these calculations, just a relocation of profits from low-tax countries toward high-tax countries.

In this instance, there would be $320 billion fewer profits abroad. To match my prior work with this method, I assume a 30 percent effective US tax rate, allowing for some base narrowing relative to the statutory rate; this implies $96 billion in additional revenue in 2017.[18]

For all three methods, there should be some adjustment downward to account for the fact that some haven income belongs abroad; following country-by-country data, I suggest about two-thirds might be attributed to the United States. However, when considering the overall magnitude of profit shifting, there should also be some adjustment upward for the profit shifting of foreign multinational companies.

C. Plausible Estimates from US Country-by-Country Data (Positive Profit Sample)

Unsurprisingly, following the same three methods with the data set that is limited to those companies with positive profits generates higher estimates. In the table below, I show both the full sample and an *average* of the full sample and the positive-profit sample.

Table 4: Indicators of the Magnitude of Profit Shifting in 2017

	Full Sample Country-by-Country Data	**Average of Full Sample and Positive Profit Sample** Country-by-Country Data
Estimate of a 35 percent country-by-country minimum tax	$134 billion	$170 billion
Assigning all havens (defined as effective tax rate < 10%) the world average profit/employee ratio	$96 billion	$118 billion
Removing tax elasticity and reallocating existing profits accordingly	$96 billion	$122 billion

[18] Using the statutory rate instead would match the other two methods and increase the estimate substantially. In addition to the higher tax rate on the reassigned income, the calculated amount of profits abroad also changes, due to the higher discrepancy between the US and the foreign rate.

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Both sets of estimates are *before* adjusting for the share attributed to the United States and the profit shifting of foreign companies. These two considerations together will slightly lower the numbers, to about 95 percent of their size in Table 4.[19]

To take the most conservative approach, one would use the full country-by-country sample, and assign only 2/3 of the revenue back to the United States, ignoring the profit shifting of foreign multinational companies. One would also focus on those methods that attempt to isolate profit shifting from real responses, the bottom two rows. Even so, one finds a magnitude of $64 billion; as a comparison, the Congressional Budget Office reports US federal corporate tax revenues for fiscal year 2017 were $297 billion.[20]

A possible benchmark estimate would scale the above numbers by 95.5 percent, reflecting both the 2/3 of revenue assigned back to the United States and the plausible scale of foreign company profit shifting, and average the positive profit and full sample estimates (to focus more, but not exclusively, on companies with positive profits). Again, focusing on the bottom two rows, that would generate a range of $113 to $117 billion.

In Clausing (2020), I also show estimates based on the direct investment income series and the adjusted income series. The entire range of estimates indicates that profit shifting is a large problem in 2017. The smallest estimate is of the total revenue cost from US MNC profit shifting is $61 billion (from the second method above and the adjusted series). As noted above, the adjusted series generates smaller numbers due to the smaller share of income in tax havens in that series, which is likely to reflect the omission of some foreign-to-foreign profit shifting. Even so, the costs of profit shifting are still large.

These calculations are easily shown on simple spreadsheets. Readers can also easily scale numbers to their own preferred elasticities or their favorite data series. While no data series is perfect, together they provide a good sense of the plausible magnitude of the profit shifting problem.

D. Other Studies and Sources

The findings from this analysis of US country-by-country data are compatible with the large magnitudes of profit shifting suggested by other recent research. None of those studies use data

[19] As noted in the text, the US activity share is about 2/3 in 2017. I use several different data series to assess the US share of real activity, but they all generate a roughly two-thirds share. For the 2017 US country by country data, the average of the US share of employees, assets, and sales is 68.8 percent, excluding stateless income from the denominator. In the US BEA data for 2017, the average of employee and sales shares is 67.1 percent, and the average (also) including employment compensation is 70.9 percent. The profits of foreign multinational companies operating in the United States relative to US multinational companies operating abroad is 39 percent in 2019, the most recent year available. This uses the "income without current cost adjustment" series from https://www.bea.gov/international/di1usdbal for US MNC income abroad, and a parallel series from https://www.bea.gov/international/di1fdibal for foreign MNC income. Foreign affiliate income in the United States of $209 billion is compared to US affiliate income abroad of $535 billion. Since both numbers are after-tax, that could justify using a somewhat higher ratio. I estimate the before-tax ratio at 42 percent. Thus, if we scale x by x*(2/3)*1.42, the total number would be about 95 percent of the original number.

[20] See https://www.cbo.gov/about/products/budget-economic-data#2. Last accessed 17 May 2020.

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that includes double-counting. Guvenen et al (2018) use macroeconomic data, together with US BEA data on direct investment earnings, and find that earnings are misattributed across countries due to profit shifting. In 2012, this implies that the US tax base should be about $280 billion larger, with correspondingly smaller tax bases in many haven countries. Zucman (2014, 2015) also suggests large US revenue losses due to profit shifting. Tørsløv, Wier, and Zucman (2018) use macroeconomic data on foreign affiliate statistics, estimating that about 40 percent of multinational profits are shifted to tax havens each year, and that this profit shifting has a substantial impact on macroeconomic statistics.

Bilicka (2019) has a particularly illuminating study that relies on UK confidential corporate tax return data. Using these data, she finds that foreign multinationals underreport their UK profits by about 50 percent, and that eliminating differences in reported taxable profits would lead to revenue gains of 62 percent in 2014. While these estimates are large, they are also conservative, since her matching method requires her to exclude the largest multinational companies from the analysis.

Bilicka's work also indicates that utilizing accounting data underestimates the size of the profit shifting problem; companies report zero taxable profits in many instances where they report positive accounting profits. This study thus suggests an additional reason why firm level data (showing measures of accounting profits) does not find large profit shifting effects. This paper also shows the importance of the fixed costs associated with profit shifting; companies may not respond smoothly to variations in tax rate differences.

That insight is compatible with the nonlinear elasticities emphasized in Dowd, Landefeld, and Moore (2017) as well as the above estimates of profit shifting. The vast majority of profit shifting appears to be destined for a small handful of tax havens (or "investment hubs"). There is relatively less tax responsiveness present in the data among higher-tax rate countries.

This large scale of profit shifting is also compatible with the large estimates of the revenue loss due to deferral under the prior US tax system (though those are distinct concepts), the large estimates of revenue loss due to base erosion found by the OECD (2015), and the large scale of the profit shifting problem noted by IMF researchers, including Crivelli et al. (2016), who find particularly large revenue losses for developing countries (as a share of GDP).

IV. Conclusion

Finding a perfect measure of multinational company tax avoidance is difficult for many reasons. Recent releases of country-by-country data may be well-suited to considering the magnitude of the profit shifting problem, but such data also have limitations, including their limited time span.

Preliminary evidence from 2017 US country-by-country data indicate that profit shifting is a large problem with significant revenue consequences for the US government. A variety of simple estimation techniques indicate that the US revenue loss from profit shifting is likely to exceed $100 billion in 2017, or about a third of federal corporate tax revenues. Clausing (2020) includes comparison estimates using several other data series. All of these estimates share one common feature: profit shifting is a large and consequential problem.

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This corroborates the work of many other researchers who have studied this topic, including estimates by the IMF, the OECD, and the US JCT as well as studies that work with tax data, US survey data, macroeconomic data, UK tax and accounting data, and balance of payments data.

While there are many sophisticated empirical studies using accounting databases such as Orbis, these studies risk understating the profit shifting problem since they omit almost all haven income, and studies often fail to account for the disproportionate role of a small number of very large companies. Since haven income is particularly important, and tax elasticities are likely to especially large for such countries due to nonlinearities, that makes these databases of limited use for a study of profit shifting.

Moving forward, it is important to continue to learn about the strengths and weaknesses of each data set, working to continuously refine our estimates in light of new information and better techniques. Each data set reviewed here comes with serious limitations, so it is important to compare results across data sets in order to estimate plausible magnitudes of profit shifting. New data sources, such as broader and more refined releases of country-by-country reporting data, will prove valuable.

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