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Round-tripping of Domestic Profits under the American Jobs Creation Act of 2004

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Abstract

The American Jobs Creation Act of 2004 provided a substantial tax benefit to U.S. multinational corporations in the form of a temporary 85 percent deduction for repatriated dividends. An unforeseen consequence of this tax holiday may have also been to induce firms to reallocate earnings toward low-tax foreign subsidiaries for immediate repatriation and thereby escape higher rates of corporate income taxation. Exploiting affiliate-level variation in tax savings, I estimate reported earnings among repatriating affiliates to have increased by \$17 billion, suggesting moderate aggregate effects of a large temporary reduction in the repatriation tax on short-run income reallocation activity.

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1 Introduction

Multinational investment and income reallocation have been brought to the forefront of tax policy debates as policymakers grapple with the tradeoff between raising revenue and enhancing economic growth. In an attempt to promote domestic investment, the American Jobs Creation Act of 2004 (AJCA) granted U.S. multinational corporations (MNCs) a one-year 85 percent dividends received deduction (DRD), thereby temporarily reducing the maximum tax due upon repatriation of foreign earnings from 35 to 5.25 percent. While the effect of this tax holiday on U.S. investment and growth remains a matter of debate, the provision was widely exploited, with U.S. MNCs repatriating \$312 billion in qualifying dividends over the 2004-2006 period (Redmiles, 2008)—a fact that has since been frequently cited to justify a renewed tax holiday or the outright elimination of foreign-source income taxation.

Countering this argument, in part, have been several studies documenting how repatriated earnings were spent, including Blouin and Krull (2009); Graham, Hanlon and Shevlin (2010); Dharmapala, Foley and Forbes (2011); and Faulkender and Petersen (2012). In contrast, virtually nothing is known about the sources from which remittances were funded.[1] The presumed intent of the DRD was for multinationals to repatriate inefficiently reinvested foreign earnings for domestic investment, but a further possibility is that the AJCA induced MNCs to shift U.S. domestic earnings to subsidiaries in low-tax countries in order to repatriate these immediately under the terms of the temporary tax holiday.[2]

The purpose of this paper is to consider the empirical evidence for this unconventional form of round-tripping by U.S. MNCs and measure the elasticity of income shifting with respect to the associated tax savings, using the repatriation response to the DRD for cleaner identification than has previously been feasible. The fundamental challenge in identifying the extent of tax-motivated income reallocation is to distinguish between variation in reported income that is attributable to real firm activities versus tax-sheltering.[3] This has been complicated in the

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[1]Survey evidence presented in Graham, Hanlon and Shevlin (2010) constitutes the sole exception.

[2]An MNC facing the top statutory corporate income tax rate in the U.S. of 35 percent would have been eligible to save up to \$0.2975 in taxes per dollar of income shifted abroad and repatriated by avoiding the U.S. corporate income tax on 85 percent of the earnings involved (i.e. $(0.85)(0.35) = 0.2975$).

[3]For more comprehensive reviews of the literature on the determinants of multinational capital flows and the location of reported earnings, see e.g., Gordon and Hines (2002) or Devereux (2006).

literature by the need to rely primarily on cross-jurisdictional variation in tax rates which may be correlated with other potentially-unobserved jurisdiction-specific effects, such as quality of legal protections, governance, etc.

The approach in this paper builds on previous techniques for estimating the extent of multi-national tax avoidance by considering the effects of variation in foreign tax rates that is plausibly exogenous to other time-invariant country-specific determinants of real economic activity. This follows from differences in tax rates at the affiliate level being driven by the United States' unilateral implementation of the DRD coupled with firms' endogenous decision to exploit this tax holiday. Taking care to account for the endogeneity of firm repatriation decisions, the estimation strategy surmounts the primary obstacles to accurately quantifying the extent of income reallocation by U.S. MNCs. In contrast to the previous literature, however, the focus of this paper is on the consequences of a short-lived policy whose effects might conceivably exceed the long-term behavioral responses to taxation considered elsewhere (Slemrod and Bakija, 2008).

Using confidential data collected by the Bureau of Economic Analysis (BEA) on the operations of non-bank U.S. multinationals and their majority-owned foreign affiliates, I find a short-run semi-elasticity of foreign pre-tax rates of return with respect to pre-AJCA effective foreign tax rates of -1.2—slightly larger than the average long-run profit rate semi-elasticity of -0.8 reported in Heckemeyer and Overesch's (2013) meta-analysis.[4] This translates to an aggregate increase of $17 billion in foreign earnings across all dividend-paying affiliates as a direct consequence of the tax holiday, equal to roughly one eighth of total qualifying AJCA remittances in the estimation sample or 1.5 percent of total U.S. corporate profits in 2005. Notably, this figure likely represents an upper bound on the *short-term* round-tripping of *domestic* earnings given that the benchmark proxy of income shifting used in its calculation reflects earnings reallocated from all sources, including other foreign jurisdictions.

More narrowly-defined measures of income shifting related to earnings stripping or transfer pricing yield no statistically-significant evidence of round-tripping effects in the aggregate. Despite their potential for identifying specific income reallocation mechanisms, the lack of sig-

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[4]Heckemeyer and Overesch (2013) incorporate estimates of tax-motivated income shifting from 25 studies at the intersection of accounting and economics, starting with Hines and Rice (1994). Earlier studies tend to find relatively larger elasticities, as reviewed, for example, in de Mooij (2005).

nificant overall responses may simply suggest that a wider variety of mechanisms were involved (or a combination thereof).[5,6] Tax planning strategies including the popularly-dubbed "double Irish Dutch sandwich" illustrate this challenge, whose effects can only be measured in the data through changes in reported earnings and might predominantly reflect income reallocation among foreign affiliates. Nevertheless, modest relative improvements in related-party affiliate trade balances among particular subsets of MNCs suggest that transfer pricing may play a more important role among smaller or less tax-sophisticated firms.

Evidence among groups of MNCs classified according to the adequacy of their foreign cash holdings in relation to maximum permissible dividend amounts or among affiliates categorized by industrial sector is consistent with differences in incentives and scope for engaging in tax avoidance. Affiliates of MNCs whose permanently reinvested foreign earnings (PRE) exceeded $500 million and had sufficient liquidity to repatriate the corresponding maximum were thus the most responsive to the tax incentives, followed by liquidity-constrained MNCs with lower PRE amounts. Constraints on financing dividend payments out of foreign cash holdings may therefore play different roles depending on the success of past tax planning.

In comparison to estimates of the dollar amounts of income shifted out of the U.S. on an annual basis (Gravelle, 2009), or to the incremental response to weakened regulatory enforcement documented in Klassen and Laplante (2012), the AJCA appears to have elicited a relatively modest incremental tax avoidance response despite exceptional incentives. In light of ongoing proposals for the U.S. to adopt a territorial tax system in which foreign earnings are exempt from domestic taxation, this may provide guidance regarding the *transitional* consequences of implementing the equivalent of a permanent DRD.[7] *Long-run* effects on tax avoidance under

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[5]Few studies document the empirical importance of specific income shifting channels. Notable exceptions with respect to transfer pricing include Clausing (2001, 2003) and Bernard, Jensen and Schott (2006), while Newberry and Dhaliwal (2001), Desai, Foley and Hines (2004b), and Buettner and Wamser (2013) focus on debt shifting.

[6]See Grubert and Mutti (2009) for a discussion of income reallocation mechanisms involving royalty payments and their growing importance as part of corporations' international tax planning strategies since the advent of "check-the-box" regulations, whereby U.S. multinationals are allowed to declare certain foreign affiliates as disregarded or pass-through entities for U.S. tax purposes. Data on these types of intrafirm payments are only collected at infrequent intervals by the BEA.

[7]Over the first decade of the millenium, ten OECD countries adopted territorial tax systems, leaving the U.S. increasingly unique in its treatment of foreign-source income (Dittmer, 2012). The United States' share of real GDP among OECD countries with worldwide tax systems ($N = 7$) has correspondingly increased from 56.4 percent in 2005 to 78.2 percent in 2010. Most "territorial" regimes are more accurately implemented as dividend

a territorial regime might be either weaker or stronger than those resulting from the AJCA depending on the extent to which tax planning strategies require time to establish versus the extent to which firms perceived the DRD as a truly exceptional one-time opportunity. These results are nevertheless instructive insofar as U.S. MNCs were either unable or unwilling to engage in more extensive income reallocation over the short term.

The remainder of the paper is organized as follows: Section 2 describes the U.S. tax system and important features of the AJCA, and develops the simple intuition for modeling simultaneous income shifting and dividend repatriation, Section 3 discusses the data used, Section 4 characterizes the empirical analyses and their results, and Section 5 concludes.

2 U.S. International Taxation and DRD Incentives

2.1 General Features

The U.S. tax system operates on a worldwide basis such that income earned by resident corporations is taxed by the government regardless of origin.[8] Most types of income are only taxed upon repatriation, however, at which time foreign income and withholding taxes are creditable against U.S. tax liability in order to avoid double taxation of profits earned abroad.

Deferral of taxes on foreign-source income introduces opportunities for firms to minimize their tax liabilities via strategic reallocation of taxable income, either by locating real investment in low-tax regions or by attributing income to low-tax countries through various channels. Aggressive transfer pricing may for instance be used to facilitate income reallocation through the artificial understatement of prices imposed on sales from a U.S. parent to a foreign subsidiary in a low-tax jurisdiction coupled with overstatement of purchase prices in the opposite direction. Tax authorities require that transactions between related parties occur at arm's-length prices to reduce the scope for this type of activity, but this is necessarily difficult to enforce when com-

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exemption systems, typically with an exemption rate around 95 percent. The DRD was effectively a temporary 85 percent dividend exemption with an allowance for foreign tax credits on the non-deductible 15 percent of dividend payments.

[8]See Desai, Foley and Hines (2001) for a thorough description of the U.S. tax system as it applies to foreign-source income.

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parable transactions between unrelated firms do not exist. Similar incentives and regulations apply to the manipulation of loan terms (i.e. earnings stripping), while additional mechanisms for shifting income may involve cost-sharing, licensing fee, and royalty payment arrangements for the development and use of intangible assets.

2.2 Changes Induced by the AJCA

The AJCA changed the U.S. tax system in several respects, the focus of this paper being the special one-time 85 percent DRD for the repatriation of unremitted foreign earnings from U.S. controlled foreign corporations.[9] Under the terms of the AJCA, U.S. MNCs were allowed to deduct 85 percent of all extraordinary dividends (i.e. any dividends in excess of average repatriations over the median three out of five years ending June 30, 2003) from domestic tax over the course of single fiscal year. Practically speaking, the majority of firms could opt to apply the DRD in fiscal 2004 or 2005, while firms with fiscal years ending in July-September could have delayed their remittances until fiscal 2006.

In order for dividends to qualify for the DRD, firms were required to receive approval for their domestic reinvestment plans from their boards and had to comply with restrictions on permissible uses of repatriated funds.[10] Previously-taxed (deemed repatriated) Subpart F earnings from passive investments or unincorporated branch operations were required to be automatically included in repatriated earnings, but firms could otherwise elect which dividends to apply to the base requirement (i.e. the "ordinary" portion of repatriated earnings not eligible for the DRD). Provided that the foregoing conditions were met, qualifying dividend repatriations could not exceed the amount of PRE designated on firms' last annual financial statements dated and audited prior to June 30, 2003 or $500 million, whichever was greater (Redmiles, 2008).[11] Firms were not required to pay dividends out of PRE, however, which—as pointed out in Graham,

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[9]In addition to changes in the number of foreign tax credit baskets and the length of available carryforward and carryback periods, the AJCA also legislated the phasing out of the extraterritorial income credit for U.S. exporters and provided a new deduction for domestic manufacturing. I assume that these additional provisions were not systematically related to foreign affiliates' effective tax rates and therefore had no material impact on the repatriation and income reallocation decisions of U.S. firms.

[10]See Redmiles (2008) for a list of authorized reinvestment expenses.

[11]In situations where firms indicated the amount of taxes averted by declaring earnings to be indefinitely reinvested rather than the amount of earnings themselves, the limit on qualifying dividends was determined as the grossed up tax liability (i.e. tax liability/0.35).

Hanlon and Shevlin (2011)—might otherwise trigger substantial book tax expenses.[12]

2.3 Theoretical Implications

Relative to the usual treatment of U.S. corporate income, the DRD presented highly favorable treatment for foreign income. For every $1 of pre-tax earnings repatriated under the AJCA, U.S. MNCs (m) face a tax savings rate equal to 85 percent of the difference between the statutory U.S. corporate income tax rate ($\tau_m^c = 0.35$) and any applicable foreign income taxes (τ_{im}^c) and withholding taxes (τ_{im}^w) levied on affiliate i of MNC m:

$$TS_{imt} = (0.85)(\tau_{mt}^c - \tau_{imt}^c - \tau_{imt}^w(1 - \tau_{imt}^c)) \tag{1}$$

The strategy pursued in this paper is to examine the extent to which firms responded to these country-specific reductions in repatriation taxes by adjusting reported earnings among MNC affiliates, where the availability of a tax reduction is conditional upon choosing to remit earnings under the terms of the DRD. Appendix A.1 describes a model of foreign investment that allows firms to choose the optimal level of dividend remittances and income shifting as a function of time-varying repatriation tax rates. This extension of Weichenrieder (1996) yields the following intuitive implications.

First, neither the level of dividend remittances nor relative rates of return at home and abroad should have any bearing on the desired extent of *additional* income shifting under the AJCA. This is in contrast to incentives under the ordinary treatment of foreign-source income, wherein the repatriation tax deters all round-tripping of domestic earnings and both dividend repatriation and income reallocation are simultaneously determined on the basis of prevailing tax rates and rates of return. The attractiveness of tax avoidance is modified by a temporary reduction in the repatriation tax, however, by opening a channel for simultaneous income shifting and dividend repatriation, *conditional on qualifying remittances being optimally chosen to be*

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[12]Even if unrecognized U.S. tax liabilities on PRE were previously capitalized into share prices (at ordinary repatriation tax rates), as suggested by Collins, Hand and Shackelford (2001) and Oler, Shevlin and Wilson (2007), managers may nevertheless be wary of reversing this designation for fear of attracting investor lawsuits.

non-zero.[13] Since round-tripping of earnings does not affect the location of capital, the income reallocation decision is solely dictated by the firm's tax deductible marginal cost of tax avoidance and the difference between domestic and foreign tax rates characterized in (1).

Second, the decision of whether to exploit the tax holiday or continue to exploit deferral in turn hinges on the relation between the present after-tax value of \$1 of retained foreign earnings remitted at the end of the firm's intended foreign investment horizon versus the same \$1 repatriated and subjected to the preferential repatriation tax in period $t = 1$ and reinvested domestically. This decision rests naturally on the relative magnitudes of the foreign and domestic tax rates τ_{im}^c and τ_m^c (and therefore the difference in the repatriation tax with and without the DRD) as well as on the relative domestic and foreign rates of return in the future. If deferral remains preferable to repatriation, the resulting optimal income reallocation reflects the type of tax avoidance that has been studied elsewhere in the literature, which necessarily incorporates an additional opportunity cost to reallocating domestic earnings and retaining these abroad.

3   Data

Microdata on the financial operations of U.S. MNCs are drawn from the annual surveys of U.S. Direct Investment Abroad conducted by the Bureau of Economic Analysis (BEA) for the period 1998-2006. Pursuant to the International Investment and Trade in Services Survey Act, all U.S. reporters (parent corporations) are required to report a wide range of income statement, balance sheet, and other financial and operating information for themselves and for each of their non-bank majority-owned foreign affiliates (subject to certain firm size thresholds). Confidentiality assurances and punishment for non-compliance ensure unsurpassed accuracy and breadth of coverage. These data are a unique source of information on intrafirm financial flows and trade, including dividend payments from affiliates to their owners and bilateral related-party versus arm's-length goods imports and exports.

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[13]Firms with sufficient cash assets held abroad to finance the maximum permissible repatriation amount could conceivably have seen no benefit to round-tripping. Even so, as discussed in the previous section, drawing down PRE might come at a non-trivial cost for financial statement reporting purposes (Graham, Hanlon and Shevlin, 2011). Moreover, very few firms appear to have held their PRE in sufficiently liquid short-term assets as to avoid all costly asset liquidation in order to finance their repatriations. I return to this issue in Section 4.6.

Following Desai, Foley and Hines (2004a), I compute my preferred measure of affiliate-level effective foreign tax rates as the country-specific median ratio of taxes paid to pre-tax income across all affiliates operating in the same country.[14] These avoid the typical endogeneity concerns associated with using individual firm-specific rates while also being preferable to statutory corporate rates due to the prevalence of foreign tax holidays used to lure investment from abroad.[15] Importantly, these measures are calculated on the basis of financial statement information from 2003, *before firms could have responded to the AJCA*.[16]

Several adjustments to the measures of dividend remittances reported to the BEA are required to approximate the determination of *qualifying* dividend payments for purposes of the DRD. Fundamentally, this distinction revolves around: (1) the year in which a firm elected to exploit the DRD, (2) the extent to which total reported remittances exceeded the base-period (i.e. ordinary) repatriation amount, and (3) the allocation of qualifying and non-qualifying remittances among dividend-paying subsidiaries. An additional complication inherent to intrafirm dividend payments requires yet further special treatment. Details of the strategy employed for distinguishing qualifying dividends from total repatriations and for tracing dividends through multinational ownership chains without double-counting appear in Appendix A.2, along with more general details about the data and variable construction.

Table 1 presents the aggregate annual quantities of total and qualifying remittances identified in the BEA data alongside the payment amounts reported in Redmiles (2008) on the basis of official tax return data.[17] The BEA data thus account for almost two thirds of the official

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[14]In addition to excluding affiliates with negative net income from the set of observations used to calculate the within country-year median effective tax rates (ETRs), I also exclude affiliates with negative reported tax payments. The latter step is a slight departure from the Desai, Foley and Hines (2004a) methodology. This procedure explicitly truncates the sample of tax rates from below at 0 while implicitly restricting median effective tax rates to not exceed 100 percent.

[15]Tests involving alternative tax rate measures, including ones based on statutory foreign tax rates or long-term effective tax rates at the affiliate level yield qualitatively similar results (unreported).

[16]A legislative history of the AJCA—including opposition to the DRD from the U.S. Treasury and Bush Administration—suggests that U.S. MNCs could not have anticipated enactment of the tax holiday far in advance of the bill's final passage in the Senate on October 11, 2004. Indeed, an analysis of stock market reactions to the AJCA by Baghai (2013) suggests that considerable investor uncertainty persisted until that date. In unreported robustness checks, I test this assertion by re-running the preferred empirical specifications using 2002 data for the pre-AJCA period instead of 2003 and obtain virtually identical estimates of round-tripping effects.

[17]Total annual remittances are equal to the sum of the qualifying and non-qualifying amounts for all multinationals who had non-zero *qualifying* remittances in the year in question. E.g., 2006 dividend payments by a firm that exploited the DRD in 2005 are not counted toward the 2006 total remittance amount.

Table 1: Aggregate Dividend Repatriations under the AJCA ($ Billions)

	Fiscal Year			
	2004	2005	2006	2004-2006
Total Repatriations:				
BEA	20	183	4	207
Memo item: Tax return data	n.a.	n.a.	n.a.	362
Qualifying Repatriations:				
BEA	15	166	4	185
Memo item: Tax return data	n.a.	n.a.	n.a.	312

tally of qualifying remittances, with the missing one third presumably owing to the omission of smaller foreign affiliates and banks from the BEA data. Only multinationals with valid survey responses in multiple years at the level of both the non-bank U.S. reporter and the foreign affiliate are included in the analysis, where the existence of valid responses is contingent upon verification of reported information by the BEA for accuracy and consistency. Excluding the benchmark survey years (i.e. 1999 and 2004), majority-owned non-bank foreign affiliates were only required to report dividend remittance information if they had at least $150 million of total assets, sales or gross operating revenues, or net after-tax income (positive or negative). Hence, dividend remittances from smaller affiliates are not included, nor even remittances from newly-established affiliates or affiliates fluctuating around the reporting size threshold.[18]

Table 2 compares the mean and median characteristics of dividend repatriating and non-repatriating affiliates in 2005. For confidentiality reasons, "medians" are calculated as the average of five observations centered around the true median. Among dividend-paying affiliates, average qualifying remittances were approximately $270 million in 2005, roughly two thirds of average retained earnings. Measured in levels, repatriating and non-repatriating affiliates appear similar in terms of basic characteristics such as assets, cash holdings, or R&D expenditures. However, average changes in reported pre-tax earnings are significantly larger among dividend-

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[18]To the extent that new subsidiaries were established for the purpose of taking advantage of the DRD, these are missing from the analysis. Anecdotal evidence points to at least a few examples. Emaks Worldwide, for instance, stated in its fiscal 2006 financial statement that "The Company repatriated $2.650 [million] in foreign earnings during 2005 from a newly formed controlled foreign corporation ("CFC") in Hong Kong [under the terms of the American Jobs Creation Act]." As reported in *Bloomberg*, the recipient of a much larger $1.2 billion in qualifying dividend payments, Forest Labs, similarly established new subsidiaries in Bermuda and the Netherlands in 2005 for tax-minimizing purposes (i.e. a double Irish Dutch sandwich) (Drucker, 2010*b*). Forest Labs has since been audited for its transfer pricing practices (Drucker, 2010*a*).

Table 2: Affiliate Characteristics by Repatriation Status
(2005 Cross-Section)

	Non-Repatriaters		Repatriaters		t
	Mean	Median[a]	Mean	Median[a]	Statistic[b]
Millions of dollars:					
Qualifying dividends	0	0	269.9	38.4	-2.97
Dividends	5.9	0	283.9	47.6	-3.03
Assets	1419.7	334.1	1764.3	343.6	-1.00
Sales	517.1	187.4	839.5	299.7	-3.35
Cash assets	45.8	2.8	44.8	8.1	0.09
R&D expenses	4.7	0	4.6	0	0.03
Retained earnings	138.4	35.1	404.2	52.0	-2.05
$\Delta_{2005-2003}$ Pre-tax income	17.0	3.0	165.3	13.7	-3.41
$\Delta_{2005-2003}$ Non-equity pre-tax income	12.4	1.7	65.1	10.3	-2.88
Non-equity pre-tax income (2003)[c]	28.0	6.3	62.3	19.9	-3.80
Percent of pre-AJCA (2003) affiliate assets:					
Sales	148.6	61.8	181.3	104.3	-2.36
Cash assets	6.5	0.9	8.9	2.6	-2.66
R&D expenses	0.7	0	0.8	0	-1.08
Retained earnings	18.3	11.1	25.9	18.2	-3.40
$\Delta_{2005-2003}$ Pre-tax income	3.4	0.9	9.2	4.7	-4.38
$\Delta_{2005-2003}$ Non-equity pre-tax income	2.3	0.5	7.3	3.2	-4.01
Non-equity pre-tax income (2003)[c]	5.2	2.3	10.6	7.5	-7.39
Tax savings rate	0.101	0.082	0.126	0.114	-5.56
N		3113		412	

Repatriating affiliates are identified according to the pass-through method.

[a] For confidentiality reasons, reported "medians" are calculated as the average of five observations centered around the true median.

[b] t-statistics are for tests of differences in means across groups of repatriating and non-repatriating affiliates (allowing for unequal variances).

[c] Repatriation status in 2003 is defined on the basis of remittance activity over the entire 2004-2006 period. $N = 3656$ and $N = 562$ for non-repatriating and repatriating samples, respectively.

paying affiliates as are the available tax savings per dollar remitted, sales, and retained earnings. Taking affiliate size into account by scaling all terms by affiliate assets (as of 2003) tends to further accentuate these differences. In particular, the statistical precision of the differences across groups in reported average earnings rates and retained earnings is amplified, while repatriating affiliates also have significantly greater cash holdings by this metric.
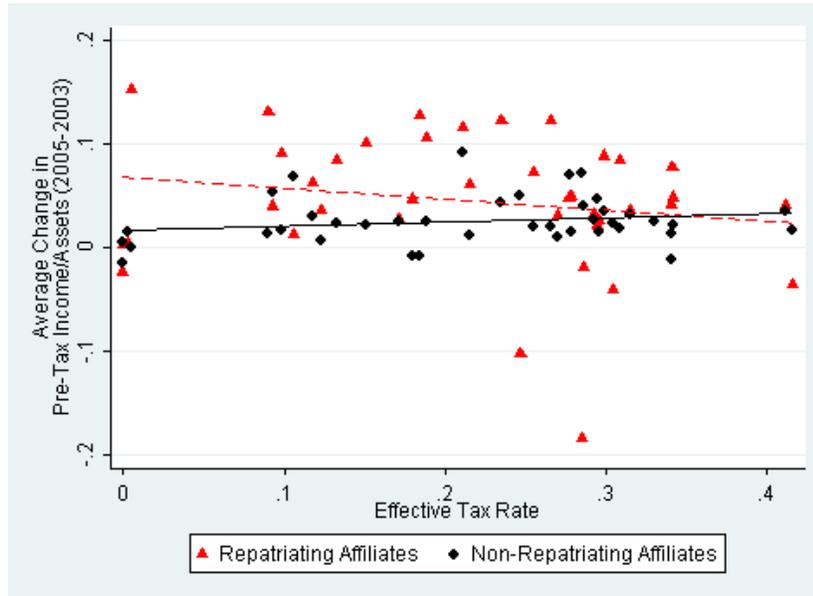

Figure 1: Changes in Non-Equity Pre-Tax Income/Assets
by Country and Repatriation Status

Though non-causal, the evidence on changes in reported affiliate earnings presented in Table 2 is consistent with the round-tripping hypothesis. This is further supported in Figure 1, which plots average changes by country in non-equity pre-tax returns on assets for groups of repatriating and non-repatriating affiliates (limited to countries with at least 20 foreign affiliates in 2005). At equal effective tax rates, repatriating affiliates (triangles) tended to exhibit larger increases in pre-tax returns over the 2003-2005 period than their non-repatriating counterparts (dots), with the largest such differences manifesting themselves in jurisdictions with relatively low tax rates (i.e. below 25 percent). Beyond a 35 percent foreign tax rate—the point at which dividend repatriation under the DRD would yield no tax benefit—this relationship appears reversed or non-existent (albeit for only a small set of countries).

4 Empirical Methods and Results

4.1 Difference-in-Differences

Based on the discussion from Section 2, a reduced-form expression for the level of earnings shifted to affiliate i of multinational m in period t, s_{imt}, can be expressed as:

$$s_{imt} = \alpha + \beta(\tau_{mt}^c - \tau_{imt}^c) + \gamma(\tau_{mt}^c - \tau_{imt}^*) + \theta g(\mathbf{X_{imt}}) + \eta_i + \nu_m + \mu_t + \varepsilon_{imt} \qquad (2)$$

where τ_{imt}^* is the total tax rate applied to contemporaneously-earned and remitted foreign income (i.e. foreign plus domestic income taxes net of foreign tax credits).[19] Under the usual U.S. treatment of foreign-source income, $\tau_{imt}^* = \tau_{mt}^c$. Under the 85 percent DRD, however, firms choosing to remit qualifying dividends ($D_{imt} > 0$) will instead face $\tau_{imt}^* = (1 - 0.85)(\tau_{mt}^c - \tau_{imt}^c) + \tau_{imt}^c = 0.15\tau_{mt}^c + 0.85\tau_{imt}^c$ which will be less than τ_{mt}^c among subsidiaries located in lower-tax jurisdictions. The first term in (2), $\beta(\tau_{mt}^c - \tau_{imt}^c)$, thus captures the effect of the ordinary tax savings associated with reallocating domestic profits to a low-tax subsidiary (without remittance) while the second term, $\gamma(\tau_{mt}^c - \tau_{imt}^*)$, reflects the impact of tax savings through round-tripping.

The cost of reallocating income from the U.S. parent to the foreign affiliate is captured by the function $g(\mathbf{X_{imt}})$ in expression (2), where the vector of arguments $\mathbf{X_{imt}}$ includes both the opportunity cost of income reallocation—captured by domestic and foreign rates of return—along with firm characteristics that are associated with real costs of tax avoidance. Harris et al. (1993) and Grubert and Slemrod (1998) document the role of intangible assets and related proxies including research and development (R&D) and advertising expenses in mitigating these costs, perhaps because of the greater difficulty for the tax authority to implement the arm's-length criterion for evaluating transfer prices when multinationals transact heavily among themselves in services and intangibles for which no competitive market exists. Consequently, $\mathbf{X_{imt}}$ should also be thought to include measures of the importance of intangibles to multinational activities. This is accomplished in the initial specifications below by including pre-AJCA affiliate and par-

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[19]In practice, τ_{imt}^c is approximated by the pre-AJCA median effective tax rate among all U.S. affiliates operating in the same country as affiliate i, as described in the previous section. The use of affiliate-specific effective tax rates (computed as pre-AJCA five-year averages) or statutory corporate and withholding tax rates in place of these country-specific rates yield qualitatively similar results.

ent R&D expenditures as a proportion of assets along with their respective interactions with the tax savings term, plus an array of NAICS 2-digit industry dummy variables.

To the extent that $\mathbf{X_{imt}}$ cannot capture the full-spectrum of idiosyncratic variation in country/affiliate-, parent-, or year-specific tax avoidance costs, this is accounted for in (2) through η_i, ν_m, and μ_t, respectively. Estimation of this model in levels may produce biased results if the unobserved effects η_i or ν_m are correlated with foreign tax rates, however, hence the virtue of examining income reallocation responses to a temporary tax change whose magnitude varies across countries and firms. Differencing the expression in (2) for s_{imt} with respect to the pre-AJCA period provides a means of controlling for time-invariant fixed effects that may be correlated with foreign tax rates—such as political stability, legal protections, ownership structure, etc.—without eliminating cross-country variation in the tax savings rate. Assuming constant tax rates over the period 2003-2006,[20] this yields the main estimating equation:

$$\Delta_{t-2003}s_{imt} = \tilde{\alpha} + \tilde{\gamma}0.85(\tau_m^c - \tau_{im}^c) \cdot I[D_{imt} > 0] + \tilde{\theta}\Delta_{t-2003}g(\tilde{\mathbf{X}}_{\mathbf{imt}}) + \tilde{\mu}_t + \tilde{\varepsilon}_{imt} \qquad (3)$$

where $\tilde{\gamma}$ is the approximate panel difference-in-difference estimator involving selection into a continuum of possible tax savings treatments.[21] The dimensionality of $\mathbf{X_{imt}}$ is also reduced as a consequence of differencing with all observable time-invariant proxies for income shifting costs dropping out. The remaining components of $\tilde{\mathbf{X}}_{\mathbf{imt}}$ hence only include terms interacted with the reduction in the repatriation tax.[22]

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[20]Top statutory corporate tax rates were indeed fixed in the U.S. and a majority of foreign countries over this time period. Of those countries whose rates were changed, the largest changes occurred in countries with very modest U.S. MNC presence (Office of Tax Policy Research, 2008). Regardless, the empirical analysis uses only pre-determined (2003) effective foreign tax rates to avoid incorporating contemporaneous tax rate variation that might be driven by patterns of income reallocation.

[21]Availability of the DRD in only one of multiple consecutive fiscal years requires differencing over unequal intervals at different years in the panel, hence the "approximate" nature of the approach. Restricting the following analysis to a single differenced period (2005) while excluding all 2004 and 2006 repatriating firms yields results that are qualitatively unchanged.

[22]So long as firms abide by relatively long-term foreign investment plans, changes in long-run average returns should be essentially zero and do not belong in $\tilde{\mathbf{X}}_{\mathbf{imt}}$.

4.2 Instruments

The remaining econometric challenge consists of accounting for the endogenous decision among U.S. multinationals to exploit the DRD (i.e. $I[D_{imt} > 0] = 1$). Viewing the joint income reallocation and repatriation decisions as an omitted variables problem wherein shifted earnings are conflated with real returns on foreign activity, failure to account for the endogeneity of the repatriation decision at the extensive margin will have an ambiguous impact on estimates of the tax savings effect. This follows from the fact that the greater the scope for reallocating earnings, the more likely it is that an affiliate would choose to remit earnings under the DRD, yet the lower the effective foreign tax rate, the more attractive should be foreign (re)investment among affiliates experiencing the largest increases in real profitability. I apply a control function estimation procedure (a.k.a. two-stage residual inclusion; henceforth denoted CF) to address these competing sources of endogeneity bias. This technique is well suited to the treatment of discrete or censored endogenous regressors and requires estimation of only a single first-stage regression despite including multiple endogenous interaction terms in particular specifications.

Foley et al. (2007) present evidence implying that cash is retained abroad in large part to avoid triggering U.S. taxation of foreign-source income. Mirroring this finding, proponents of the AJCA argued that a tax holiday would encourage MNCs to remit unproductive earnings parked abroad by lowering the barrier imposed by the repatriation tax. As such, foreign cash holdings and other liquid assets should have been first in line for repatriation under the DRD as a relatively costless source of funds out of which to finance dividend remittances, *independent of any new round-tripping incentives.* The relative proportion of cash and other short term assets to total assets held by foreign affiliates prior to enactment of the AJCA should therefore have had a strong influence on whether a specific MNC affiliate opted to repatriate earnings for the purpose of exploiting the DRD without directly influencing tax avoidance activity.[23]

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[23]Instrument exogeneity may be threatened if high foreign cash holdings are a signal of high income growth potential, or conversely, a signal that profitable foreign investment opportunities have been exhausted. In practice, there is little evidence of any direct relationship between earnings growth and one-, two-, or three-period lagged cash holdings over the 2003-2006 period (results not shown). If anything, lagged affiliate cash holdings may exert a negative influence on the growth of non-equity pre-tax income—consistent with a view of trapped equity—but the measured effects are not statistically significant. Relatedly, instrument exogeneity could also be violated if firms had simultaneously begun shifting earnings and amassing foreign cash *prior to the AJCA* with the explicit intent of repatriating these earnings under the terms of the DRD. For reasons already

The primary instrument for the endogenous extensive-margin repatriation decision—and therefore the reduction in the repatriation tax, $TS^*_{imt} \equiv 0.85(\tau^c_m - \tau^c_{im}) \cdot I[D_{imt} > 0]$—is thus the exogenous statutory tax rate reduction available under the AJCA interacted with an indicator for whether the affiliate held a high proportion of total assets as cash or other short term assets in 2003, relative to the median level of such holdings across all affiliates:

$$TSCashIV_{im,2003} \equiv 0.85(\tau^c_m - \tau^c_{im}) \cdot I\left[\frac{Cash_{im,2003}}{Assets_{im,2003}} > Med\left(\frac{Cash_{2003}}{Assets_{2003}}\right)\right]$$

For completeness, each of the uninteracted component terms in the above expression are included as overidentifying restrictions in the tobit first-stages estimated under the CF approach.

4.3 Proxy Measures of Income Reallocation

Given that shifted earnings are not directly observable, I construct several proxy measures of s_{imt} from the BEA data. Following much of the literature, I use the level of reported pre-tax foreign earnings as my main benchmark. The single distinction that I make is that equity income is stripped from the calculation of affiliate pre-tax income so as to exclude dividends received from downstream foreign affiliates. The resulting measure of non-equity pre-tax income, $NEPI_{imt}$, is a fairly indirect measure of round-tripping, however, and confounds profits shifted from the parent with those shifted from other foreign affiliates.[24]

In addition, I also construct a pair of narrower income reallocation proxies to focus explicitly on transfer pricing and earnings stripping channels for manipulating reported earnings. The first of these measures exploits information on intrafirm trade in goods to calculate the difference between the affiliate's trade balance vis-à-vis the U.S. parent versus its trade balance with unaffiliated U.S. parties.[25] Tax-motivated transfer pricing should be the reflected in dispropor-

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mentioned above, this possibility appears remote given the history of the AJCA and the similarity of results based on 2002 versus 2003 pre-AJCA data.

[24]An intuitively appealing method of identifying outbound shifting of U.S. domestic profits consists of estimating analogous specifications to (3) from the perspective of the U.S. parent (using parent-level tax savings rates computed on the basis of average effective foreign tax rates among all affiliates in the MNC group, weighted variously by affiliate assets, cash holdings, sales, or base period dividends). Predictably, these tests tend to suffer from low power, thereby making inference about aggregate effects unreliable. Otherwise, these tests generally mirror the affiliate-level results and are available upon request.

[25]This measure of income shifting is also employed at the country-level by Clausing (2001).

tionately large related party trade balances relative to the corresponding arm's-length balances in low tax countries. In contrast to reported earnings, this measure of the trade balance differential, TBD_{imt}, provides a relatively direct approach to inferring profit reallocation activity and speaks exclusively to the extent of round-tripping induced by the DRD between U.S. parents and their affiliates. Notably, any observed round-tripping of this nature encompasses both price and volume effects and hence both transfer pricing as well as intertemporal shifting of trade flows at unchanged transfer prices (e.g. by drawing forward purchases by the U.S. parent), the latter being potentially more manipulable over a short horizon.

I compute a second narrower proxy measure of income shifting as affiliate interest receipts net of payments (i.e. net interest received, NIR_{imt}). This is intended to capture earnings stripping through the issuance of high-interest short-term loans from affiliates based in low-tax jurisdictions to other related parties (including the U.S. parent) in more highly-taxed countries. Like the measure of non-equity pre-tax income, it is impossible to infer the origin of any earnings that might be shifted in this manner given the nature of the data, but it nevertheless addresses one of the important perceived mechanisms for multinational tax avoidance.

Each of these measures of s_{imt} appear as the dependent variable in different regression specifications after converting these into real dollar amounts, differencing with respect to the pre-AJCA period (2003), and scaling by pre-AJCA affiliate assets to account for firm size heterogeneity.[26]

4.4   Empirical Model

The foregoing discussion yields the following main regression specification:

$$\Delta_{t-2003} \frac{s_{imt}}{Assets_{im,2003}} = \tilde{\alpha} + \tilde{\gamma} TS^*_{imt} + \beta_0 \Delta_{t-2003} \frac{ER_{imt}}{ER_{im,2003}} + \beta_1 I[EFTC_{m,2003} > 0]$$
$$+ \beta_2 I[HoldingCo_{imt}] + \beta_3 I[Indirect_{imt}] + \beta_4 DRD\_Months_{imt} \quad (4)$$
$$+ \tilde{\theta} \Delta_{t-2003} g(\tilde{\mathbf{X}}_{\mathbf{imt}}) + E[Resid^{TS^*}_{imt} | \mathbf{Z_{imt}}] + \tilde{\mu}_{\mathbf{t}} \mathbf{Year_t} + \tilde{\varepsilon}_{imt}$$

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[26]Contemporaneous measures of assets are avoided due to the fact that these would likely be endogenous to the repatriation response, the primary concern being that the liquidation of low-yielding short-term assets to finance remittances from low-tax foreign affiliates would mechanically inflate subsequent returns.

where $E[Resid_{imt}^{TS^*}|\mathbf{Z_{imt}}]$ denotes the generalized residual derived under the CF approach from the first stage tobit regression of TS^* on the high-cash holdings instruments represented by the vector $\mathbf{Z_{imt}}$.[27] Besides $\mathbf{\tilde{X}_{imt}}$, additional covariates used to account for features of firm structure include indicator variables for whether a multinational was in an excess foreign tax credit position prior to the DRD (to establish whether firms might have had lower-cost alternatives for repatriating earnings than under the DRD), $I[EFTC > 0]$, or whether the affiliate was a holding company or indirectly-held ($I[HoldingCo]$ and $I[Indirect]$, respectively).[28] DRD_Months quantifies the number of months over which a firm was eligible to exploit the DRD and is based on firms' exogenous fiscal year end month.[29] Cross-country currency fluctuations over the differenced periods are controlled for using percentage changes in bilateral exchange rates over the corresponding span of years, $\Delta_{t-2003}\frac{ER_t}{ER_{2003}}$, so as not to confuse increases in reported foreign earnings due to tax avoidance with differential patterns of foreign currency appreciation. Year fixed effects absorb any additional macroeconomic variation that is common to all affiliates in the years in which the DRD could be implemented. As is common practice, I exclude all affiliates belonging to U.S. financial sector firms (NAICS 52) on the grounds that these are subject to several special provisions in the realm of international taxation and may therefore face unique tax incentives. Finally, I restrict the sample to exclude those observations outside the 1st through 99th percentiles of the distribution of the dependent variable.

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[27]See Vella (1993) and Vella and Verbeek (1999) for a description of this methodology. Viewing the endogeneity of TS_{imt}^* as an issue of selection on unobservables, the treatment of selection bias and discrete endogenous variables in Heckman (1978, 1979) can be extended by adapting this approach to estimate second stage structural equations solely on the set of "treated" dividend repatriating affiliates, with any bias resulting from selection controlled for through the appropriately-computed generalized residual. Doing so produces very similar estimates of the main tax savings effect as for the full sample, albeit with slightly larger standard errors.

[28]Holding companies are defined by the BEA as affiliates with a NAICS code 5512 and more than 50 percent of net income earned through equity investments. The use of holding companies is commonly associated with multinational tax avoidance strategies whereby foreign earnings can be redeployed without transiting through the U.S. (and triggering the repatriation tax), as highlighted in Altshuler and Grubert (2003) and Desai, Foley and Hines (2003).

[29]Firms with a December fiscal year end (i.e. the modal end month), for example, were coded as facing 2 months of DRD eligibility in 2004, 14 months through 2005, and 0 months in 2006. Firms with a September fiscal year end, in contrast, had 0 eligibility months in fiscal 2004, 11 eligibility months through the end of fiscal 2005, and 23 eligibility months through 2006. It is tempting to think of this variable as an additional exclusion restriction for the determination of firm repatriation decisions. However, fiscal year end months also generate macroeconomic variation over the period for which income statement and balance sheet items are reported.

4.5 General Results

OLS and CF results from estimation of (4) with non-equity pre-tax income as the dependent variable are presented in Table 3. Standard errors are clustered by MNC and bootstrapped in the case of the latter CF estimates. As shown across the first three columns of Table 3, a 1 percentage point reduction in tax savings due to round-tripping, TS^*, is associated with a statistically-significant increase in reported non-equity pre-tax affiliate income of roughly 0.16-0.19 cents per dollar of affiliate assets—approximately a 1.4-1.7 percent increase over its 2003 level for the average dividend-paying affiliate. Moreover, as shown in specification (B), the AJCA tax savings terms interacted with pre-AJCA R&D expenditures at both the affiliate and parent level only have imprecisely-estimated positive effects on reported affiliate income. Once industry fixed effects are accounted for, there is thus little evidence to support the conjecture that firms that rely more heavily on intangibles were more actively engaged in income reallocation, and the remaining analyses therefore focus on specification (A) and extensions thereof. Correspondingly, the CF estimate from specification (A) implies an estimated \$17 billion increase in reported earnings across all dividend-repatriating affiliates for the express purpose of exploiting the DRD, equal to approximately one eighth of qualifying remittances in the estimation sample.

Comparing the OLS and CF results in Table 3 suggests only a very modest degree of (net) upward bias in the OLS estimates of the round-tripping effect.[30] Table 4 reports the set of tobit first-stage results used to derive the generalized residual included in the CF specifications of Table 3 to control for the endogenous variation in TS^*. Based on the instrument t-statistics, the predetermined *potential* repatriation tax savings rate, $0.85(\tau_m^c - \tau_{im}^c)$ (TS_{imt}), and its interaction with the proportion of affiliate assets held as cash in the pre-AJCA period relative to the median affiliate, $TSCashIV_{im,2003}$, appear to serve as good predictors of MNCs' endogenously-activated tax savings rates on round-tripped earnings.[31]

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[30]The coefficient on the generalized residual $E[Resid^{TS^*}|\mathbf{Z}]$ in the second-stage CF regression is not statistically distinguishable from zero, such that one cannot reject the null hypothesis of no endogeneity.

[31]The corresponding least squares first-stage regression for specification (A)—which fails to account for the sharp non-linearity in TS^*—yields an instrument F statistic of 27.9, well above the Staiger and Stock (1997) or Stock and Yogo (2002) weak instrument critical values. First- and second-stage results for all specifications estimated by either two-stage least squares (2SLS) or two-stage residual inclusion are available upon request. 2SLS first-stage results for specification (B) suggest possible weak instrument bias, owing primarily to difficulty in predicting values for the repatriation tax savings × affiliate R&D interaction. This serves as a further motive

Table 3: Income Reallocation and Dividend Repatriation: OLS and CF Results

$Y = \Delta_{t-2003}\frac{NEPI_{imt}}{Assets_{im,2003}}$	OLS		CF	
	(A)	(B)	(A)	(B)
TS^*_{imt}	0.192***	0.164***	0.156**	0.131
	(0.047)	(0.060)	(0.070)	(0.081)
$\Delta_{t-2003}\frac{ER_{imt}}{ER_{im,2003}}$	-0.009	-0.009	-0.009	-0.009
	(0.022)	(0.022)	(0.024)	(0.024)
$I[EFTC_{m,2003} > 0]$	-0.023**	-0.022**	-0.023***	-0.022**
	(0.009)	(0.009)	(0.009)	(0.009)
$I[Indirect_{imt}]$	-0.007	-0.007	-0.007	-0.007
	(0.004)	(0.005)	(0.004)	(0.004)
$I[HoldingCo_{imt}]$	-0.043***	-0.043***	-0.043***	-0.043***
	(0.008)	(0.008)	(0.008)	(0.008)
DRD_Months_{imt}	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
$TS^*_{imt} \cdot \frac{R\&D_{im,2003}}{Assets_{im,2003}}$	-	3.910	-	3.829
	-	(4.315)	-	(4.762)
$TS^*_{imt} \cdot \frac{R\&D_{m,2003}}{Assets_{m,2003}}$	-	0.398	-	0.369
	-	(1.391)	-	(1.553)
$E[Resid^{TS^*}_{imt}|\mathbf{Z_{imt}}]$			0.012	0.012
			(0.016)	(0.016)
Constant	-0.046*	-0.046*	-0.046	-0.046
	(0.027)	(0.027)	(0.031)	(0.031)
N	8810	8810	8810	8810
R-squared	0.043	0.043	0.043	0.043

Significance levels are designated according to: *** p<0.01, ** p<0.05, and * p<0.10. Standard errors clustered by MNC appear in parentheses (bootstrapped for the CF procedure). Year and NAICS 2-digit industry fixed effects are included in all specifications.

Table 4: Income Reallocation and Dividend Repatriation:
First-Stage Tobit Results for TS^*_{imt}

$Y = TS^*_{imt}$	Coeff.	t-stat
$TSCashIV_{im,2003}$	0.029***	3.46
$0.85(\tau^c_m - \tau^c_{im})$	0.909***	18.76
$I\left[\frac{Cash_{im,2003}}{Assets_{im,2003}} > Med\left(\frac{Cash_{2003}}{Assets_{2003}}\right)\right]$	0.038	0.80
$\Delta_{t-2003}\frac{ER_{imt}}{ER_{im,2003}}$	-0.013	-0.24
$I[EFTC_{m,2003} > 0]$	0.028***	4.68
$I[Indirect_{imt}]$	-0.067***	-8.96
$I[HoldingCo_{imt}]$	0.087***	7.54
DRD_Months_{imt}	0.017***	25.87
N	8810	
Pseudo R-squared	0.26	

Significance levels are designated according to: *** p<0.01, ** p<0.05, and * p<0.10. t-statistics are based on standard errors clustered by MNC.

Turning to the narrower measures of income shifting, Table 5 reports the tax savings effects on affiliate trade balance differentials and net interest receipts alongside the corresponding estimates carried over from specification (A) in Table 3. Neither set of results provides strong statistical support for the round-tripping hypothesis via transfer pricing or earnings stripping in the aggregate. This may reflect a combination of factors. Approximately 75 percent of all affiliates report zero bilateral trade with the U.S., thereby reducing the scope for strategic transfer pricing involving traded *goods*, while the absence of any significant tax effect on net interest receipts may reflect the existence of countervailing responses among cash-constrained affiliates that opted to borrow to finance their desired level of remittances (implying a high marginal cost of income reallocation).[32] More tellingly, it may be that firms instead utilized different (unobservable) channels for reallocating earnings, such as through transactions involving intangible

for applying control function techniques.

[32] According to Graham, Hanlon and Shevlin (2010), 23 percent of AJCA dividend payments were paid out of borrowed funds, including new debt. The AJCA explicitly proscribed lending by U.S. parent firms to finance their affiliates' dividend payments but did not otherwise restrict methods of financing.

Table 5: Repatriation Tax Savings Effects: All Income Reallocation Measures
(Specification (A))

$Y =$	Model	
	OLS	CF
$\Delta_{t-2003}\frac{NEPI_{imt}}{Assets_{im,2003}}$	0.192***	0.156**
	(0.047)	(0.070)
$\Delta_{t-2003}\frac{TBD_{imt}}{Assets_{im,2003}}$	-0.047	0.003
	(0.032)	(0.035)
$\Delta_{t-2003}\frac{NIR_{imt}}{Assets_{im,2003}}$	0.008*	0.005
	(0.004)	(0.007)

Significance levels are designated according to: *** p<0.01, ** p<0.05, and * p<0.10. Standard errors clustered by MNC appear in parentheses. Coefficients corresponding to the additional covariates from specification (A) are suppressed for brevity.

assets not captured by measures of trade in goods or related party lending arrangements.[33]

The results in Table 5 hence offer only relatively broad evidence of income reallocation via changes in reported earnings and preclude a determination as to the sources of shifted earnings or the mechanism(s) utilized. The estimated $17 billion aggregate effect of TS^* on affiliate non-equity pre-tax income therefore tends to overstate the amount of round-tripping of *domestic* profits induced by the AJCA since income reallocation between parents and subsidiaries cannot be distinguished from reallocation among foreign subsidiaries.

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[33]The "double Irish Dutch sandwich" tax planning strategy described in the press illustrates this challenge. Abstracting from the "double" and "sandwich" (needed to minimize Irish income and withholding taxes), suppose that parent m owns two foreign affiliates in Ireland and the Netherlands, i_{IR} and i_{NE}, both of which exist as separate entities in the BEA data but are organized for U.S. tax purposes such that i_{IR} is a disregarded entity under check-the-box rules. If i_{NE} is a first-tier holding company affiliate which licenses technology to its wholly-owned manufacturing subsidiary, i_{IR}, increased revenues to i_{IR} (e.g. through accelerated sales to the U.S. parent) will be passed along as untaxed and unobserved royalties to i_{NE}. Subsequent remittance of the holding company's increased profits to m will appear to originate with i_{NE} due to an inability to trace the source of its income further downstream, thereby biasing the estimated impact of repatriation tax savings on observed trade balances toward zero. Consistent with this mechanism, holding companies were responsible for the largest proportion of AJCA remittances at the affiliate sectoral level (Redmiles, 2008).

4.6 Response Heterogeneity

Despite the indeterminacy of the results involving interactions of TS^* with R&D expenditures, or the lack of evidence of transfer pricing or earnings stripping responses, transactions among certain types of firms may nevertheless have been more amenable to manipulation than others. The foregoing analyses largely assume homogeneous firm reactions, yet the degree to which the AJCA round-tripping incentives were exploited may have varied widely across industrial sectors or as a function of the availability of other low-cost sources of dividend financing.

Table 6: Cross-Industry Heterogeneity in Repatriation Tax Savings Effects: OLS and CF Results by Affiliate Industry

| | $\Delta_{t-2003}\frac{NEPI_{imt}}{Assets_{im,2003}}$ | | | |
| | OLS | | CF | |
Industry (NAICS):	Coeff.	(S.E.)	Coeff.	(S.E.)
Mining (210)	0.511***	(0.177)	0.863**	(0.338)
Food Manuf. (311)	0.685**	(0.253)	0.223	(0.669)
Chemical Manuf. (325)	0.235	(0.258)	-0.039	(0.486)
Machinery Manuf. (333)	0.840	(0.580)	2.121	(2.725)
Computer and Elect. Manuf. (334)	0.303	(0.223)	0.630	(0.387)
Transport Equip. Manuf. (336)	-0.017	(0.336)	-0.078	(0.595)
Wholesale Durables (423)	0.642*	(0.326)	0.801**	(0.387)
Wholesale Non-durables (424)	0.257**	(0.101)	0.139	(0.276)
Retail Trade (440 + 450)	0.921**	(0.431)	0.421	(1.498)
Information (Old Media) (5111-6)	0.066	(0.402)	0.545	(0.750)
Credit Intermediation (522)	0.084	(0.060)	-0.288	(0.241)
Financial Investments (523)	0.021	(0.039)	0.094	(0.122)
Insurance (524)	-0.052	(0.123)	-0.029	(0.424)
Professional Services (541)	0.292	(0.174)	0.637	(0.388)
Holding Companies (551)	-0.015	(0.027)	-0.036	(0.039)

Significance levels are designated according to: *** p<0.01, ** p<0.05, and * p<0.10. Standard errors clustered by MNC appear in parentheses. Coefficients corresponding to the additional covariates from specification (A) (excluding industry fixed effects) are suppressed for brevity.

Table 6 presents the results from estimation of specification (A) for the 15 NAICS 3-digit industrial sectors with the largest number of affiliates in the data.[34] Regardless of estima-

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[34] The Retail Trade and Information sectors combine multiple closely-related NAICS 3-digit sectors to yield sufficient useable observations for the empirical analysis, such that $N = 192$ for the smallest sector tabulated.

tion technique, large standard errors preclude identification of all but a few industrial sectors as having experienced important income reallocation responses.[35] Accounting for endogenous repatriation decisions, only mining and wholesale durables emerge as sectors in which affiliates were especially sensitive to round-tripping incentives. This may reflect that affiliates in the wholesale—and to a lesser extent, retail—trade sectors are merely resale arms of their parent corporations, such that the cost of resold items purchased from the parent or other foreign subsidiaries and timing of transactions may be largely arbitrary. Likewise, the timing of extraction of mineral resources and the sale thereof may also be relatively flexible.

High-technology industries do not appear to exhibit more significant round-tripping activity, despite the typical presumption that such firms have greater scope for tax avoidance due to their reliance on intangibles and despite the fact that such firms accounted for a large proportion of qualifying remittances. These observations may refer more accurately to ongoing international tax planning, however, as opposed to the *incremental* responses to temporary new tax incentives measured in this paper. Firms with long-term investments in sophisticated tax structures may hence have had limited scope for further accumulation of earnings in low-tax jurisdictions. Moreover, due to limits on the amount of repatriated earnings that could qualify for the DRD, certain firms may even have been unable to realize additional tax savings beyond those already achievable through the repatriation of existing retained earnings.

In order to explore this last possibility, I combine the BEA data with PRE data collected from firms' financial statements for fiscal year 2002 (2003 for firms with fiscal years ending in June).[36] This yields an initial matched sample of 277 U.S. parents (accounting for nearly 2/3 of foreign affiliates in the BEA data) with known PRE amounts and maximum qualifying dividends equal to $\max\{PRE, \$500 \text{ million}\}$. Foreign affiliates are categorized according to whether (1) the parent firm was constrained to repatriate an amount equal to PRE or $500 million, and (2) whether the firm had sufficient foreign cash and short-term assets (aggregated across all foreign affiliates of the MNC group based on 2003 data) to finance the entire maximum

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[35]Results involving the more narrowly-defined measures of transfer pricing and earnings stripping are virtually uniform in their lack of statistical precision and are omitted for brevity.

[36]I am grateful to Ryan Wilson and Jennifer Blouin (and their respective co-authors) for sharing a portion of these data.

dividend amount. $I[PRE\_Constrained]$ hence equals 1 if parent firms were eligible to repatriate more than \$500 million and 0 otherwise. $I[Cash\_Constrained] = 1$ characterizes MNCs with insufficient foreign liquidity. *A priori*, $I[PRE\_Constrained] = 1$ serves to distinguish, larger, more successful, and more tax-sophisticated or tax-aggressive MNCs from smaller *or* less tax aggressive firms, whereas $I[Cash\_Constrained] = 1$ designates the set of firms most likely to realize tax savings from round-tripping.

Table 7: Qualifying Dividend Limitations, Cash Constraints, and Repatriation Tax Savings Effects: OLS and CF Results

	OLS		CF	
	(1)	(2)	(3)	(4)
Panel A: $Y = \frac{NEPI_{imt}}{Assets_{im,2003}}$				
TS^*_{imt}	0.214***	-0.239**	0.160	-0.290
	(0.062)	(0.102)	(0.100)	(0.777)
$TS^*_{imt} \times I[Cash\_Constrained_{m,2003}]$	-	0.474***	-	0.467
	-	(0.171)	-	(0.768)
$TS^*_{imt} \times I[PRE\_Constrained_{m,2002}]$	-	1.070***	-	1.059
	-	(0.113)	-	(0.777)
$TS^*_{imt} \times I[Cash\_Constrained_{m,2003}]$	-	-1.130***	-	-1.121
$\times I[PRE\_Constrained_{m,2002}]$	-	(0.186)	-	(0.779)
Panel B: $Y = \frac{TBD_{imt}}{Assets_{im,2003}}$				
TS^*_{imt}	-0.099*	-0.511***	0.015	-0.390***
	(0.053)	(0.107)	(0.067)	(0.087)
$TS^*_{imt} \times I[Cash\_Constrained_{m,2003}]$	-	0.504***	-	0.498***
	-	(0.160)	-	(0.110)
$TS^*_{imt} \times I[PRE\_Constrained_{m,2002}]$	-	0.524***	-	0.520***
	-	(0.112)	-	(0.109)
$TS^*_{imt} \times I[Cash\_Constrained_{m,2003}]$	-	-0.641***	-	-0.627***
$\times I[PRE\_Constrained_{m,2002}]$	-	(0.170)	-	(0.147)

Significance levels are designated according to: *** p<0.01, ** p<0.05, and * p<0.10. Standard errors clustered by MNC appear in parentheses. Coefficients corresponding to the additional covariates from specification (A) along with baseline effects of $I[Cash\_Constrained]$, $I[PRE\_Constrained]$, and their interaction are suppressed from the table for brevity. $N = 5524$ (5801) across all specifications in Panel A (B).

Table 7 reports OLS and CF tax savings estimates allowing for heterogenous tax effects in each of the four firm groups defined by this pair of indicators. Columns (1) and (3) replicate specification (A) from Table 3 using only the sample of observations with known PRE amounts,

while columns (2) and (4) add the set of TS^*, $I[Cash\_Constrained]$, and $I[PRE\_Constrained]$ interactions. As shown in Panel A, the aggregate impact of TS^* on affiliate non-equity pre-tax rates of return in column (1) masks considerable heterogeneity among groups of firms in column (2). Affiliates of liquidity-*unconstrained* MNCs with $PRE > \$500$ million exhibit the most pronounced positive impact of TS^* on reported earnings, followed by liquidity-constrained MNCs with low ($< \$500$ million) and high ($> \$500$ million) PRE amounts, whereas the baseline group of cash-flush low-PRE firms exhibit if anything a negative income reallocation response. A similar pattern of results also appears based on the CF estimates in columns (3) and (4), though none of these effects are precisely estimated. In contrast, while affiliate trade balances (Panel B) show insignificant or even negative reactions to TS^* in the aggregate (columns (1) and (3)), differences in tax savings effects across groups of PRE- and liquidity-constrained firms are consistently significant for both the OLS and CF specifications and mirror the pattern of responses seen in the broader measure of reported earnings in Panel A.

Applied to the distribution of assets held among the dividend repatriating affiliates of liquidity-constrained, low-PRE MNCs, the estimates in column (4) imply that relative trade balance improvements among these 74 affiliates collectively contributed approximately \$500 million toward the \$600 million increase in non-equity pre-tax income reported by this same set of firms. Affiliates of unconstrained MNCs with $PRE > \$500$ million were even slightly more responsive to TS^*, but by a narrower margin than for reported earnings, such that collective improvements in TBD in this latter group accounted for a smaller proportion of reallocated earnings (i.e. less than \$300 million out of \$1.2 billion).

Transfer pricing thus appears to have served as the main mechanism for reallocating earnings among smaller firms or firms that may have had less well-established pre-existing tax planning strategies (hence, low PRE) and that had an opportunity to increase their repatriations beyond the amount that could be financed out of liquid assets. At the other extreme, cash-flush, high-PRE firms appear to have been exceptionally sensitive to the incentives for round-tripping and utilized transfer pricing among other unobserved mechanisms.[37] This latter group of firms

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[37]Results involving NIR as the dependent variable show virtually no significant association with the tax savings rate for any subgroup of firms.

admittedly represents a potentially unique group—accounting for only 12 dividend-repatriating affiliates in the estimation sample—and their responses should not necessarily be viewed as generalizable. Taken at face value, however, this would suggest that firms in this group face non-trivial costs associated with repatriating earnings out of PRE (relative to the cost of shifting income), in line with arguments in Graham, Hanlon and Shevlin (2011). Among liquidity-constrained firms with $PRE > \$500$ million—which account for a majority of firms in the sample and thus, despite somewhat lower elasticities of reported earnings, a majority of reallocated earnings—virtually none of the estimated $9.5 billion increase in reported earnings appears attributable to transfer pricing.

5 Conclusion

In contrast to other empirical findings on income reallocation, these results suggest that the AJCA triggered what might be best characterized as a modest one-time increase in tax avoidance by U.S. MNCs. Clausing (2009), for instance, estimates that U.S. multinationals would have shifted $133 billion into lower-taxed foreign jurisdictions in 2004 alone, dwarfing the $17 billion increase in reported affiliate income due to the AJCA measured here on the basis of the preferred CF results.[38] These same CF results imply an estimated semi-elasticity of affiliate rates of return with respect to effective foreign tax rates of -1.2 for the average dividend-paying affiliate, somewhat above the average semi-elasticity of reported earnings of -0.8 reported in the literature (Heckemeyer and Overesch, 2013).

Underlying these differences are two important distinctions which follow from previous studies' reliance on variation in cross-country profits or profit rates to identify income reallocation activity. First, the prior literature is inherently unable to account fully for the existence of unobserved country-specific determinants of firm profitability. Consequently, to the extent that these are correlated with tax rates, estimates of income reallocation will be biased, with the

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[38]Gravelle (2009) reviews other previous estimates of annual profit reallocation by U.S. MNCs, with revenue loss estimates ranging from around $10 billion to $60 billion. Using direct evidence on multinational rates of return from corporate tax data, Christian and Schultz (2005) identify $87 billion of shifted earnings in 2001, identical to Clausing's 2009 2002 estimate of combined domestic and foreign MNC income shifting out of the U.S. Klassen and Laplante (2012) report a $10 billion annual increase in income shifting as a result of reduced regulatory enforcement over the period 2005-2009.

usual concern being that these will be overstated due to a positive association between policies designed to promote favorable business environments. Second, even in studies with a time series dimension, the typical cross-country approach amounts to examining firm behavior in a long-run equilibrium with respect to U.S. tax treatment of foreign-source income.

By adopting a difference-in-difference approach to quantifying income reallocation behavior, the present analysis is able to account for all country fixed effects while focusing on firms' *short-run* responsiveness to large differential reductions in repatriation taxes. The tradeoff is that the measured behavior does not speak directly to the long-term consequences of reducing the repatriation tax in a permanent manner, as would occur in switching to a territorial tax regime. It is therefore conceivable that the absence of more extensive evidence of round-tripping behavior may merely be a reflection of the average firm's inability to respond to the tax incentives provided under the DRD on a short-term basis. This may be especially true among firms with pre-existing long-term tax planning strategies, which could explain the absence of stronger reactions among liquidity-constrained firms with accumulated PRE in excess of $500 million or among pharmaceutical and high-technology firms.

From a policy evaluation standpoint, it appears that the AJCA did not lead to large reductions in domestic corporate tax revenue by reason of round-tripping, as may have otherwise been feared. Furthermore, for the purposes of contemplating international tax reform more broadly, it also appears unlikely that moving to a territorial tax system in the U.S. would lead to a massive increase in reallocation of domestic profits for tax avoidance purposes in the short term.[39] This does not preclude the possibility that the AJCA rewarded firms that had historically engaged in extensive profit reallocation, as has been alleged by critics of the DRD. Repatriating multinationals may also have feared that election of the tax holiday would by itself attract special scrutiny from the tax authority, thereby dampening incentives for tax avoidance, in which case implications for longer-term activity are less direct. The absence of more conclusive evidence of aggregate round-tripping effects by means of transfer pricing or earnings stripping might also reflect the use of more sophisticated arrangements involving payments not directly observed

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[39]The distinction between short-run versus long-run tax avoidance is obviously not one to be ignored. Given how little is known about differences in multinational tax avoidance by type of tax system at any horizon, however, evidence of transitional consequences is nevertheless critical to sound policymaking.

in the data, such as royalties or licensing fees. This last point is especially important given the increasing prominence of intangible assets as a source of firm profits and is left for further exploration.

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A Appendix

A.1 Theory

Consider a two-period model of foreign investment involving a single U.S. multinational parent m with a mature foreign subsidiary i operating in a relatively low-tax country.[40] The multinational's objective consists of maximizing the present value of after-tax cash flow accruing to the parent over both periods.[41] In the first period $(t = 1)$, parent and subsidiary each earn pre-tax income of $F(k_{m1})$ and $f(k_{i1}) + \rho b_{i1}$ on their respective domestic and foreign capital stocks k_{m1} and k_{i1} and foreign cash holdings b_{i1}. The pre-tax world rate of return on passive assets, ρ, is assumed to be equal to $f'(k_{i1})$ such that the foreign subsidiary has exhausted all profitable active investment opportunities, whereas $F'(k_{m1}) \geq \rho$, thereby allowing for the possibility of more profitable redeployment of capital by the parent.[42] Both profit functions are subject to diminishing returns, $F''(\cdot) < 0$ and $f''(\cdot) < 0$, and subsume all production costs.

Prior to reporting period $t = 1$ income to the tax authority, the multinational chooses the optimal level of domestic income to report as earned by the subsidiary, s_{i1}, along with the level of dividend remittances, d_{i1}. Following Gordon and Hines (2002), the cost of income shifting, $c(s_{it})$, is assumed to be a convex function in s_{it} and incorporates a firm-specific cost shifter κ_i to capture potential heterogeneity in tax avoidance capabilities,[43] and costs are assumed to be borne by the parent in a tax deductible manner.

All reported foreign earnings not remitted to the U.S. parent at the end of the first period are retained by the subsidiary and invested in the passive asset, b_{i2}, until the end of the second period, at which point all foreign operations must be liquidated. Hence, dividend remittances at the end of period $t = 2$ are determined by the choices taken in period $t = 1$, while $s_{i2} = 0$ must necessarily hold due to the non-zero cost of income shifting coupled with worldwide taxation. Discounting period $t = 2$ cash flow at the *after*-tax world rate of return, β, the firm's optimization problem can be expressed as

$$\max_{\{s_{i1}, d_{i1}\}} \sum_{t=1}^{2} \beta^{t-1} \left\{ (1 - \tau_m^c) \left[F(k_{mt}) - s_{it} - c(s_{it}) \right] + (1 - \tau_t^d) d_{it} \right\} \tag{5}$$

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[40] "Maturity" is used in the manner first introduced by Hartman (1985) to designate foreign subsidiaries which are no longer in need of parent equity injections and are capable of financing themselves out of retained earnings.

[41] In the interest of simplicity, this model abstracts from the issue of worldwide averaging of foreign tax credits across multiple subsidiaries while keeping the number of channels for financial flows to a minimum (e.g., by ruling out parent equity injections) and preserving the incentives for deferral that are inherent to the U.S. tax system. Extending the model to multiple periods would not change its qualitative predictions, but the assumption of a finite investment horizon is critical (i.e. foreign earnings cannot be "permanently" or "indefinitely" reinvested abroad in the literal sense, accounting designations notwithstanding).

[42] One possible motive for holding cash abroad in this context is provided in Foley et al. (2007) wherein the repatriation tax deters domestic reinvestment of trapped foreign equity.

[43] Gordon and Hines (2002) define the cost of income shifting as $c(s_{it}) = \kappa_i s_{it}^2$, with κ_i being inversely proportional to the level of real subsidiary income. This quadratic functional form assumption is unnecessary in the present model, and κ_i may be thought to reflect additional firm characteristics such as reliance on intangible assets and intellectual property to the extent that these may reduce the probability of detection of income manipulation.

subject to

$$d_{i1} \in \left[0, (1 - \tau_i^c)\big(\rho b_{i1} + f(k_{i1}) + s_{i1}\big) + b_{i1}\right] \tag{6}$$

$$s_{i1} \in [0, F(k_{m1}) - c(s_{i1})] \tag{7}$$

with the latter constraints restricting remittances and shifted earnings to be non-negative while also precluding borrowing to finance first-period remittances and the reporting of negative domestic earnings.

In order to characterize the AJCA and its incentives for round-tripping of U.S. earnings, the repatriation tax, τ_t^d is allowed to vary between the two periods, whereas the domestic and foreign corporate income tax rates τ_m^c and τ_i^c are taken to be time invariant.[44] In particular, $\tau_1^d = \left[(1 - 0.85I[d_{i1} > 0])(\tau_m^c - \tau_i^c)\right]/(1 - \tau_i^c)$ and $\tau_2^d = (\tau_m^c - \tau_i^c)/(1 - \tau_i^c)$ such that $\tau_1^d < \tau_2^d$ is the relevant repatriation tax conditional on the firm's election to exploit the tax holiday, and $\tau_1^d = \tau_2^d$ otherwise.

Liquidation of foreign operations at the end of the investment horizon (i.e. period $t = 2$, by assumption) furthermore implies that

$$d_{i2} = (1 - \tau_i^c)\big[f(k_{i2}) + \rho b_{i2}\big] + b_{i2}$$

where

$$k_{i2} = k_{i1} \text{ (by assumption of } f'(k_{i1}) = \rho \text{ and } f''(\cdot) < 0\text{), and}$$

$$b_{i2} = (1 - \tau_i^c)\big[\rho b_{i1} + f(k_{i1}) + s_{i1}^*\big] - d_{i1}^* + b_{i1}$$

Substituting these last equalities directly into the Lagrangian, $\mathcal{L}$, characterizing the firm's maximization problem and solving for the first order conditions with respect to d_{i1} and s_{i1} yields

$$\frac{\partial \mathcal{L}}{\partial d_{i1}} : \lambda - \lambda^0 \equiv (1 - \tau_1^d) + \beta\left\{(1 - \tau_m^c)F'(k_{m2})(1 - \tau_1^d)\right\} \tag{8}$$

$$- \beta\left\{(1 - \tau_2^d)\left[1 + \rho(1 - \tau_i^c)\right]\right\}$$

$$\frac{\partial \mathcal{L}}{\partial s_{i1}} : \alpha\big(1 + c'(s_{i1}^*)\big) - \alpha^0 - \lambda(1 - \tau_i^c) \equiv -(1 - \tau_m^c)\big(1 + c'(s_{i1}^*)\big) \tag{9}$$

$$+ \beta\left\{(1 - \tau_2^d)\left[1 + \rho(1 - \tau_i^c)\right](1 - \tau_i^c)\right\}$$

$$- \beta\left\{(1 - \tau_m^c)^2 F'(k_{m2})\big(1 + c'(s_{i1}^*)\big)\right\}$$

where λ^0 and α^0 are the Lagrange multipliers corresponding to the non-negativity constraints on d_{i1} and s_{i1}, respectively, while λ and α refer to the corresponding upper bounds.

Solving for the first order conditions subject to the additional constraint that all foreign earnings are repatriated at the end of the second period, and working through the full set of Kuhn-Tucker conditions yields the following primary results. First, the decision of whether or

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[44]Foreign withholding taxes introduce an additional layer of taxation, thereby further complicating the income reallocation and repatriation decision. This extra complication does not yield any strong new insights with regards to round-tripping of domestic earnings, however, and withholding taxes are excluded from the model. In practice, withholding taxes in this context can be thought of as raising the effective foreign tax rate (as used in the following empirical analysis) above the statutory corporate rate.

not to exploit the DRD depends upon

$$\beta(1 - \tau_2^d)\left[1 + \rho(1 - \tau_i^c)\right] \gtreqqless (1 - \tau_1^d)\left[1 + \beta(1 - \tau_m^c)F'(k_{m2})\right] \qquad (10)$$

which implies that whenever the benefits of deferral outweigh the benefits of the reduction in the repatriation tax in the first period (i.e. the term on the left hand side of the relation in (10) is larger than the term on the right), the firm will naturally choose $d_{i1}^* = 0$, and conversely, the firm will choose $d_{i1}^* > 0$ whenever this relation is reversed.[45] The decision of whether to exploit the tax holiday or exploit deferral thus depends on the relation between the present after-tax value of \$1 of retained foreign earnings remitted at the end of period $t = 2$ versus the same \$1 repatriated and subjected to the repatriation tax in period $t = 1$ and reinvested domestically. This decision fundamentally rests on the relative magnitudes of the foreign and domestic tax rates τ_i^c and τ_m^c (and therefore the difference in the repatriation tax across periods) as well as on the relative domestic and foreign rates of return in the second period, $F'(k_{m2})$ and ρ: the lower the foreign tax rate and the lower the pre-tax foreign rate of return on cash holdings relative to the domestic rate of return in period $t = 2$, the greater the incentive for positive tax holiday remittances.

Whenever it is optimal to exploit the DRD (i.e. $d_{i1}^* > 0$), the optimal choice of s_{i1}^* must consequently satisfy

$$(1 - \tau_m^c)c'(s_{i1}^*) \equiv 0.85(\tau_m^c - \tau_i^c) \qquad (11)$$

provided that the upper bound constraint on the level of desired income shifting is non-binding. (Otherwise, $s_{i1}^* = \bar{s}_{i1} \equiv F(k_{m1}) - c(s_{i1})$ such that reported domestic profits are 0 whenever $(1 - \tau_m^c)c'(\bar{s}_{i1}) < 0.85(\tau_m^c - \tau_i^c)$.) As expected, this implies that domestic profits should be shifted to the foreign subsidiary up to the point where its tax deductible marginal cost is equal to the marginal benefit of round-tripping, regardless of the precise non-zero level of earnings remitted under the temporarily-reduced repatriation tax.

If instead $d_{i1}^* = 0$, round-tripping is shut off and there exists an alternate interior solution for s_{i1}^* that solves

$$\frac{\lambda^0}{1 - \tau_1^d} \equiv \beta\left[1 + \rho(1 - \tau_i^c)\right]\frac{c'(s_{i1}^*)}{1 + c'(s_{i1}^*)} > 0 \qquad (12)$$

where λ^0 represents the shadow value associated with remitting negative earnings (i.e. paying dividends from the parent to the foreign subsidiary). These last two expressions differ insofar as (12) incorporates the opportunity cost of reallocating domestic profits to the foreign subsidiary *without* immediate repatriation and reflects the difference between the foregone return on domestic reinvestment and a possibly inferior foreign rate of return.

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[45]In the special case where $\beta \leq 1/(1 + \rho(1 - \tau_i^c))$ (i.e. the after-tax world rate of return exceeds the after-tax return for subsidiary i, $\rho(1 - \tau_i^c)$), $d_{i1}^* = 0$ can never be optimal provided that $F'(k_{m2}) \geq 0$ because the present value after-tax rate of return on foreign retained earnings is effectively negative, and it is therefore always preferable to exploit any available reduction in the repatriation tax in the first period. This differs from the proposition in Hines and Rice (1994) wherein permanent reinvestment of foreign earnings coupled with annual repatriation of passive income under Subpart F produces an equivalent outcome to immediate repatriation under a zero percent repatriation tax, assuming equivalent domestic and foreign pre-tax rates of return. More generally, deferral of this sort is preferred so long as $\rho/F'(\cdot) > (1 - \tau_m^c)/(1 - \tau_i^c)$. Here, taxation of first period (active) earnings may be delayed no more than a single period, and rates of return at home and abroad are allowed to differ and conceivably exceed the world rate of return.

A.2 Data

The following table characterizes the set of raw data items drawn directly from the BEA's annual and benchmark surveys of U.S. Direct Investment Abroad. Multinational m is the non-bank majority stakeholder (i.e. the U.S. parent) in non-bank foreign affiliates $i = 1, ... N_m$ and provides reports of its own consolidated domestic operations as well as for each of its separate (unconsolidated) affiliates. Year subscripts are omitted where possible.

Variable Name	Variable Description	Survey Form	Item Number
Parent:			
$Assets_m$	Total Assets	11A/10A	2032/3371
$NetInc_m$	Net Income	11A/10A	2031/3046
$EquityInc_m$	Investment Income	11A/10A	3150
$R\&D_m$	Research and Development Expenses	11A/10A	3694
$IncTax_m$	Income Taxes Paid	11A/10A	3043
Affiliate:			
$Assets_{im}$	Total Assets	11B(LF)/10B	2090
$NetInc_{im}$	Net Income	11B(LF)/10B	2051
$EquityInc_{im}$	Equity Income	11B(LF)/10B	2042+2043
$R\&D_{im}$	Research and Development Expenses	11B(LF)/10B	2138
$IncTax_{im}$	Income Taxes Paid	11B(LF)/10B	2048
$Cash_{im}$	Cash Assets	11B(LF)/10B	2077
Div_{im}	Dividend Remittances to Parent	11B(LF)/10B	2120
Exp_{im}^{AL}	(Arm's-Length) Goods Exports to U.S.	11B(LF)/10B	4178.3
Exp_{im}^{RP}	(Related-Party) Goods Exports to U.S.	11B(LF)/10B	4178.2
Imp_{im}^{AL}	(Arm's-Length) Goods Imports from U.S.	11B(LF)/10B	4173.3
Imp_{im}^{RP}	(Related-Party) Goods Imports from U.S.	11B(LF)/10B	4173.2
$IntPaid_{im}$	Interest Paid	11B(LF)/10B	2125
$IntRecd_{im}$	Interest Received	11B(LF)/10B	2124

The following measures are calculated in a straightforward manner from the above data items.

Variable Name	Variable Description	Formula
Parent:		
Inc_m	Pre-Tax Income	$NetInc_m + IncTax_m$
$NEPI_m$	Non-Equity Pre-Tax Income	$Inc_m - EquityInc_m$
Div_m	Dividend Receipts	$\sum_{i=1}^{N_m} Div_{im}$
$ExcessFTC_m$	Excess foreign tax credits	$\sum_{i=1}^{N_m} IncTax_{im} - 0.35 \sum_{i=1}^{N_m} Inc_{im}$
Affiliate:		
Inc_{im}	Pre-Tax Income	$NetInc_{im} + IncTax_{im}$
$NEPI_{im}$	Non-Equity Pre-Tax Income	$Inc_{im} - EquityInc_{im}$
NIR_{im}	Net Interest Receipts	$IntRecd_{im} - IntPaid_{im}$

Additional measures require more detailed explanations:

D_{imt}: Affiliate *Qualifying* Dividend Remittances

Qualifying dividends under the AJCA were defined as any amount exceeding average repatriations over the median three years of the five-year period ending on or before June 30, 2003. Thus, base-period (non-qualifying) dividends are

$$BaseDiv_m = \frac{1}{3}\Big[\sum_{t=1998}^{2002} Div_{mt} - \max\{Div_{m,1998}, ...Div_{m,2002}\}$$
$$ - \min\{Div_{m,1998}, ...Div_{m,2002}\}\Big]$$

such that total qualifying dividend repatriations in period t are simply

$$D_{mt} = \max\{0, Div_{mt} - BaseDiv_m\}$$

Dividends distributed out of previously-taxed Subpart F income had to be automatically included as qualifying dividends, but firms could otherwise elect which dividends to apply to the base requirement (i.e. the portion of repatriated earnings which would face the usual U.S. tax treatment). Hence, firms could be expected to attribute non-qualifying dividends to their most highly-taxed foreign affiliates first Redmiles (2008). This rule is implemented in the year an MNC opted to exploit the DRD (assumed to be true if $D_{mt} > 0$ and $D_{mt} > D_{ms}$, where t and s represent the firm-specific pair of DRD-eligible years based on fiscal year end month) by ranking affiliates according to their foreign tax rates in ascending order and assigning qualifying dividend amounts accordingly until only base-period dividends remain to be covered:[46, 47]

$$D_{imt} = \begin{cases} Div_{imt} \text{ if } \sum_{j=1}^{i} Div_{jmt} < D_{mt}, \\ D_{mt} - \sum_{j=1}^{i-1} Div_{jmt} \text{ if } D_{mt} \in \{\sum_{j=1}^{i-1} Div_{jmt}, \sum_{j=1}^{i} Div_{jmt}\}, \\ 0 \text{ otherwise.} \end{cases}$$

An additional complication inherent to the payment of dividends requires yet further special treatment. In particular, dividends may only be paid to those shareholders in a foreign affiliate with a direct ownership interest, and only in proportion to their equity stake. Consequently, if a foreign affiliate is only indirectly-held by the U.S. parent, such as if it is directly-held by a

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[46]To the extent that this allocation scheme may tend to overstate the responsiveness of qualifying remittances to the reduction in the repatriation tax, an alternative agnostic proportional allocation scheme could also be employed in the empirical analysis. In practice, this has no qualitative impact on the overall results (not shown).

[47]Dharmapala, Foley and Forbes (2011) are evidently skeptical of the ability to apply accounting rules to the BEA data and make the assumption that all dividend remittances in 2005 qualified for the DRD. Failure to account for the distinction between qualifying and non-qualifying dividends is problematic in two primary respects, however. First, a non-trivial proportion (14 percent) of those firms who took advantage of the DRD opted to do so in either 2004 or 2006 (Redmiles, 2008). Among such firms, 2005 remittances would have been ineligible for the preferential reduction in the repatriation tax. Second, other multinationals with non-zero repatriations in 2005 may nevertheless have failed to clear the base-period dividend amount (by choice or for lack of resources) or the domestic reinvestment requirement and likewise received no benefits from the DRD. Nevertheless, the view implicit in Dharmapala, Foley and Forbes (2011) is understandable given the assumptions required to approximate the rules stipulated by the AJCA, and an additional robustness check (not shown) with little qualitative effect consists of comparing results involving total remittances rather than the "qualifying" amounts calculated here.

separate holding company subsidiary of the parent, dividend remittances from the downstream affiliate must be routed through the holding company. More generally, wherever multiple tiers of ownership exist, repatriated earnings must pass through all intermediate foreign affiliate parents before reaching the ultimate U.S. owner. As a result, provisions must be made to avoid double-counting of dividend payments where earnings remitted by a downstream foreign affiliate are erroneously re-attributed to each upstream affiliate along the ownership chain (assuming these are ultimately channeled all the way to the U.S. parent). Three approaches for dealing with this issue are considered.

Under the baseline "naive" approach, double-counting is ignored and remittances are recorded exactly as reported to the BEA. In the alternative, a relatively-direct approach to avoiding double-counting consists of scaling dividend payments by the U.S. parents' direct equity interest. Thus, remittances from indirectly-held foreign affiliates that pass through wholly-owned foreign affiliate parents (e.g. holding companies) will be attributed entirely to the latter directly-owned affiliates, and only to the extent that the dividends are indeed passed through. Unfortunately, this second method fails to allow for the possibility that dividend repatriation and income reallocation decisions may lie with indirectly-held foreign affiliates. While the effective tax rate of the final payor in the ownership chain may partially determine the tax benefit associated with DRD remittances for a particular multinational, the scope for transfer pricing, for example, may exist with the initial payor through their physical operations and active trade with the U.S. parent. The third method for calculating dividend repatriations thus measures the quantity of dividends that successfully pass through the ownership chain using information on the identities and direct ownership shares of all foreign affiliate parents (who may themselves be indirectly-held by the U.S. parent), starting with the most distantly-held foreign affiliates. [48]

TS^*_{imt}: Tax Savings per Dollar Repatriated

Tax savings under the DRD are only non-zero for firms electing to exploit the provision (for one year only) and are strictly non-negative.

$$\max\left\{0, (0.85)(\tau^c_m - \tau^c_i) \cdot I[D_{imt} > 0]\right\}$$

where τ^c_m denotes the U.S. statutory corporate income tax rate of 35 percent and τ^c_i is the country-specific median effective foreign tax rate calculated as in Desai, Foley and Hines ($2004a$) for the year 2003.

Alternative measures of τ^c_i are also computed on the basis of (1) statutory corporate and withholding tax rates drawn from the Office of Tax Policy Research's World Tax Database and additional complementary sources, or (2) firm-specific effective tax rates averaged over the five-year period leading up to enactment of the AJCA. These measures yield qualitatively similar results in the empirical analysis as for the country-specific median tax rates, as do comparable tax savings measures calculated using the weighted average of all dividend-paying affiliates' tax rates within the ownership chain, with weights corresponding to the proportion of total earnings remitted.

TBD_{imt}: Differential affiliate goods trade balance

$$TBD_{imt} = (Exp^{RP}_{imt} - Imp^{RP}_{imt}) - (Exp^{AL}_{imt} - Imp^{AL}_{imt})$$

[48]In a non-trivial number of cases, indirectly-held foreign affiliates report reciprocal ownership arrangements such that no foreign ultimate owner can be identified as the direct link to the U.S. parent through the recursive algorithm used to unwind these ownership chains. Dividend payments by foreign affiliates caught up in these circular arrangements are treated as under the second method.