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NEW YORK UNIVERSITY SCHOOL OF LAW
COLLOQUIUM ON TAX POLICY AND
PUBLIC FINANCE

"The Effect of Financial Constraints on
Income Shifting by U.S. Multinationals"

Professor Kevin Markle
University of Iowa Business School

Vanderbilt-208
Time: 4:00-5:50 pm
Number 6

SCHEDULE FOR 2016 NYU TAX POLICY COLLOQUIUM

(All sessions meet on Tuesdays from 4-5:50 pm in Vanderbilt 208, NYU Law School)

1. January 19 – Eric Talley, Columbia Law School. "Corporate Inversions and the unbundling of Regulatory Competition."

2. January 26 – Michael Simkovic, Seton Hall Law School. "The Knowledge Tax."

3. February 2 – Lucy Martin, University of North Carolina at Chapel Hill, Department of Political Science. "The Structure of American Income Tax Policy Preferences."

4. February 9 – Donald Marron, Urban Institute. "Should Governments Tax Unhealthy Foods and Drinks?"

5. February 23 – Reuven S. Avi-Yonah, University of Michigan Law School. "Evaluating BEPS"

6. **March 1 – Kevin Markle, University of Iowa Business School. "The Effect of Financial Constraints on Income Shifting by U.S. Multinationals"**

7. March 8 – Theodore Seto, Loyola Law School, Los Angeles. "The Nonfalsifiability of Welfarism: Some Implications of Preference-Shifting for Optimal Tax Theory"

8. March 22 – James Kwak, University of Connecticut School of Law. "Reducing Inequality With a Retrospective Tax on Capital."

9. March 29 – Miranda Stewart, Australian National University. "Transnational Tax Law: Reality or Fiction, Future or Now?"

10. April 5 – Richard Prisinzano, U.S. Treasury Department, and Danny Yagan, University of California at Berkeley Economics Department. "Partnerships in the United States: Who Owns Them and How Much Tax Do They Pay?"

11. April 12 – Lily Kahng, Seattle University School of Law. "Who Owns Human Capital?"

12. April 19 – James Alm, Tulane Economics Department, and Jay Soled, Rutgers Business School. "Whither the Tax Gap?"

13. April 26 – Jane Gravelle, Congressional Research Service.
"Policy Options to Address Corporate Profit Shifting: Carrots or Sticks?"

14. May 3 – Monica Prasad, Northwestern University Department of Sociology.
"The Popular Origins of Neoliberalism in the Reagan Tax Cut of 1981."

The Effect of Financial Constraints on Income Shifting by U.S. Multinationals

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Abstract

When a U.S. multinational corporation shifts income from the U.S. to foreign jurisdictions, it incurs costs and reaps benefits. The benefits may be reduced if the shifted income must be returned to the U.S. as a dividend in the short term and face the same U.S. tax it would have if the income had not been shifted. Firms, then, have incentive to defer repatriation of earnings and to fund domestic cash needs with external financing. The cost of external financing, however, is increasing in financial constraints, leading to the prediction that constrained firms will be unable to defer repatriation and, therefore, will reap no benefits from shifting. Using a new methodology for measuring income shifting, we find, consistent with predictions, that financially constrained firms shift less income from the U.S. to foreign countries than their unconstrained peers. We estimate that financially constrained firms shift out 20% less of pre-shifted income than unconstrained firms. Translating this percentage to dollar values, the mean (median) constrained firm shifts $16 million ($7 million) out of the U.S. each year while the mean (median) unconstrained firm shifts $321 million ($134 million) out of the U.S. each year. Assuming that the inability to defer repatriation is the primary constraint preventing the U.S. worldwide tax system from being a de facto territorial system, we use our findings to estimate that changing to a pure territorial tax system would increase outbound income shifting by U.S. multinationals by 8%.

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1. Introduction

Calls for tax reform around the globe have recently been strengthened by a growing list of articles in the popular press highlighting corporate tax avoidance, and by large budget deficits in many developed economies. Countries assert the right to tax income earned within their borders, providing firms with incentives to shift income so that it is recognized in jurisdictions with relatively low tax rates. The benefits of such shifting are cash tax savings and an increase in reported consolidated net income. To reap these benefits, however, U.S. firms, unlike their peers domiciled in countries with territorial tax regimes, must leave the earnings abroad and bear the cost of having them trapped in foreign jurisdictions (Foley et al. 2007).[1] Research suggests that trapped earnings create frictions in internal capital markets, increasing demand for external financing (Altshuler and Grubert 2003). Therefore, if a U.S. firm is financially constrained, such that external financing for domestic cash needs is prohibitively expensive, it may not be cost-effective to leave income abroad. Because the returns to income shifting are realized when the income is left abroad (and the U.S. tax liability is deferred) while the costs of income shifting are independent of repatriation, a firm's financial constraints may affect its shifting behavior. Whether, and to what extent, financial constraints affect income shifting is the empirical question we ask in this paper.

[1] The U.S. has a worldwide international tax regime under which all profits are subject to U.S. tax, and credits are granted for taxes paid to foreign governments. Under a deferral provision in the worldwide system, the U.S. tax (minus credits claimed) is not due until the foreign earnings are repatriated to the U.S. as a dividend. The other international tax regime, which is used by most other major countries in the world, is a territorial regime. In a territorial regime, the home country exempts foreign income from domestic tax. All countries, under both types of regimes, also choose from a menu of base erosion prevention measures. For example, the U.S., under Subpart F of the Tax Code, denies the deferral provision on most types of passive income, and many countries, both territorial and worldwide, impose immediate home country taxation on income of certain types of foreign affiliates. See Markle and Robinson (2012) for further discussion of these base erosion prevention measures.

Our predictions and our empirical tests are cross-sectional; we are comparing the income shifting of constrained firms and unconstrained firms.[2] Many of the costs of income shifting (e.g., setting up structures) are likely to be fixed. If a firm has not yet borne the costs of setting up income shifting infrastructures and then becomes less constrained, we would only expect that firm to begin income shifting if it expects to remain unconstrained over a relatively long horizon so that it can amortize the costs of income shifting investment against many years of tax benefits. In addition, if a firm has already borne the fixed costs and is shifting at optimal levels and then becomes more (less) constrained, we would not predict that firm to decrease (increase) its outbound shifting because sudden and significant changes in profits in different jurisdictions are likely to be a red flag for transfer pricing audits (PWC 2013).[3]

Our empirical results suggest that U.S. firms are indeed engaged in income shifting that varies systematically and predictably with tax incentives, a result that has been documented in other research using a variety of samples and empirical methodologies. More importantly, we show that financially constrained firms are not engaged in meaningful levels of income shifting, with our results suggesting that financially constrained firms shift 9-13% less of their domestic income out of the U.S. than their unconstrained counterparts.

In order to derive these estimates, we develop a new technique to measure income shifting. The technique uses primitive inputs from publicly available financial statements to estimate the fraction of foreign earnings that is explained by sales to U.S. domestic third-party

[2] Our assumption that financial constraint is a time-invariant characteristic is consistent with extant literature. Fazzari, Hubbard, and Petersen (1988) classify firms using dividend-to-income ratios over 10 years. Hadlock and Pierce (2010) use a 5-point scale to classify firm-years and find that only 5% of observations change by more than one level. Using the level of financial constraints to divide firms into groups in the cross-section is also common in the accounting literature (e.g., Dai et al. 2013).

[3] The data confirm that financial constraint is a largely static measure. In our sample, there are 770 firms that have bond ratings (which we use to calculate our main proxy for financial constraints, *JUNK RATING*). 16 (2%) of these firms move from junk to investment grade in our sample period. 50 (6.5%) move from investment grade to junk.

customers and the fraction of U.S. domestic earnings that is explained by sales to foreign third-party customers. The resulting estimates of income shifting are more direct and require fewer restrictive assumptions than estimates obtained using other models of income shifting. Furthermore, the technique is more flexible than previous empirical methodologies used to estimate income shifting because it allows for key model parameters to vary as a function of firm-specific controls.

Our study makes a number of contributions to existing research. First, we develop a new measure of income shifting. The inputs to our model are primitives rather than proxies, and we do not make inferences about income shifting by comparing rates of return on sales or rates of productivity across jurisdictions, as in prior research. Instead, we directly estimate the baseline inbound and outbound cross-border income transfers and then show how cross-sectional differences in financial constraints affect these transfers in predictable ways, consistent with tax-motivated income shifting. Academic researchers and government regulators can use the evidence we provide to inform public policy questions surrounding the income shifting behaviors of multinational corporations.

Second, we show that financially constrained firms shift less income out of the U.S. than their unconstrained peers. This difference is consistent with our hypothesis that constrained firms' inability to obtain external financing prevents them from leaving earnings abroad to defer tax liability, thus eliminating the benefits of income shifting to foreign jurisdictions. Because constrained firms cannot reap the tax rewards of income shifting, our results suggest they forgo implementing costly income shifting strategies. This finding contributes to research on income shifting, internal financial markets, and financial constraints found in economics, finance, and accounting.

Third, we contribute empirical evidence to the ongoing debate over the effects of the international tax regime in the U.S. At a symposium held in 2010, John M. Samuels, Vice President, General Electric Corporation, suggested that the U.S. system of worldwide taxation with deferral is equivalent to a territorial system when he said, "…a company can always repatriate all or any portion of its foreign earnings at any time it chooses, with the only cost of the repatriation being the same U.S. tax that it would have had to pay if it had not shifted the income outside of the U.S. in the first place… Simply put, it is economically rational for a company to always shift as much income offshore as possible because it gets the benefit of the time value of money and sometimes the accounting benefit" (Taxes 2010).[4] Implicit in Mr. Samuels' statements is the assumption that the firm has full discretion over when it repatriates foreign earnings. In other words, these statements apply only to financially unconstrained firms.

In contrast to this opinion, Patrick Driessen, former Senior Economist at the Joint Committee on Taxation, said the following in a July, 2012 speech: "Even with the movement of intangible property offshore that has already occurred, there is still a lot of IP in the United States. To the extent that this IP is in the United States under present law for liquidity reasons (that is, why bother moving IP offshore…if the earnings are needed in the United States and thus roughly would face the same level of tax, combined U.S. and foreign, whether moved offshore or not), then MNCs would be tempted to move this IP offshore under territorial."[5] This statement acknowledges that there are fixed costs to implementing the structures that facilitate income shifting and speculates that there is a subset of firms that has chosen not to incur those costs because they are not able to leave shifted profits abroad and reap the benefits of tax deferral.

[4] Worldwide and territorial systems are often referred to as credit and exemption systems, respectively.
[5] We are grateful to Mr. Driessen for sharing the text of his speech with us.

Taken together, the statements of Mr. Samuels and Mr. Driessen suggest that the outbound shifting of unconstrained firms would be expected to remain unchanged if a territorial regime were adopted (since they are already shifting at maximum levels under the worldwide system), but that the outbound shifting of constrained firms would be expected to increase. To the extent that this point of view is descriptive, our empirical estimates of the differences in the level of shifting by constrained and unconstrained firms can be viewed as estimates of the differences in shifting under worldwide and territorial regimes.[6]

Finally, we provide estimates of the amount of income that was shifted out of the U.S. during our sample period and of the U.S. tax that was deferred as a result of the shifting. We also provide separate estimates of the amount of income shifted by financially constrained firms and financially unconstrained firms.

The remainder of the paper is organized as follows. In the next section we develop the relevant background information on multinational income shifting used throughout the study. In Section 3 we develop our hypotheses in the context of prior literature. In Section 4 we develop our new measure of income shifting and describe the research design. In Section 5 we describe the data used in the empirical tests. In Section 6 we analyze the results of our empirical tests. We make concluding remarks in Section 7.

2. Income Shifting and Financial Constraints

2.1. What is income shifting?

The phrase "income shifting" implies that there are two possible locations for a dollar of

[6] An important caveat in drawing this conclusion is that we assume all other base erosion prevention measures are held constant across the two regimes. We recognize that most proposals for the U.S. adopting a territorial regime also include additional measures intended to prevent base erosion. Thus, our conclusions relating to the effect of territorial taxation of income shifting are best viewed as upper bound estimates.

income: where it would be reported with no shifting, and where it is reported. Both options may require the transfer of income across borders; the difference is in the amounts. The first is the result of neutral investment and accounting decisions. The second is the result of strategic investment and accounting decisions designed to minimize the firm's tax burden. The incremental amount that results from tax-motivated decisions is what we consider shifted income.

From a technical point of view, transactions between related parties are governed by Section 482 of the Internal Revenue Code.[7] The Internal Revenue Manual (IRM) states that Section 482 is designed such that it "places a controlled taxpayer on tax parity with an uncontrolled taxpayer…."[8] In other words, transactions that take place between related parties should be at arm's length so that revenues and expenses are located where they would have been if all intra-company transactions had taken place between unrelated parties.

A simple example may best illustrate these concepts. Consider a U.S. widget company, WidgetCo, that sells its widgets all over the world. Each widget sold by WidgetCo in Germany leads to an income transfer from Germany to the U.S. because the arm's-length standard requires WidgetCo's German subsidiary to compensate WidgetCo U.S. for the development of the intellectual property that made the sale possible. If WidgetCo were to strategically alter the compensation that was paid by the German subsidiary in order to minimize the total tax liability on the widget sold in Germany, the strategic portion of the income transfer, not the entire transfer, would be considered shifted income.

For obvious reasons, the amount of income that is shifted is not observable to those

[7] See Section 482 of the Internal Revenue Code, available online: https://www.law.cornell.edu/uscode/text/26/482.
[8] See the Internal Revenue Manual, 4.11.5.2, available online: http://www.irs.gov/irm/part4/irm_04-011-005.html.

external to the firm. What is observable is where the income is reported once all transfers (including tax-motivated shifting) have been made. In order to estimate shifting, we need a baseline to which we can compare the post-shifted numbers. Guided by the nature of the data that are publicly available, we take as our baseline that revenue and the expenses incurred to earn it are matched and reported in the geographic location of the third-party customer. Clearly, multinational companies will make many income transfers that will result in deviations from this baseline (such as the payment from Germany to the U.S. to comply with the arm's-length standard in the WidgetCo example above), even when no income is being strategically shifted for tax purposes. Using available data, we are able to directly estimate the average total transfers made by our sample firms. We then use cross-sectional variation in income shifting incentives to identify the proportion of total transfers that is tax-motivated.

Our focus in this study is on income shifting out of the U.S. by U.S. multinational corporations. We do not examine shifting that may occur among the foreign subsidiaries of U.S. corporations, nor do we examine shifting to or from the U.S. by foreign firms. While such income shifting is potentially important and interesting, we are interested in how financial constraints interact with the U.S. tax policy of worldwide taxation with deferral to influence the amount of income that is shifted out of the U.S. by U.S. multinationals.[9]

2.2. Inbound and outbound shifting

The factors that drive reported income away from the baseline used in this study (that revenue and the expenses incurred to generate those revenues are reported in the geographic location of the third-party customer) are not expected to be symmetrical for inbound and

[9] We also note that the income shifting we observe could fall at any point on the legal spectrum, from fully-compliant with all laws and regulations, to willfully fraudulent, but the distinction is unimportant for our research question.

outbound transfers. Compliance with the arm's-length standard often creates the need to decouple the location of income from the location of revenues. For U.S. multinational corporations, product development, manufacturing, administration, and other general expenses, which generate revenues in foreign countries, are often incurred in the U.S.[10] As such, we expect there will be relatively more expenses in the U.S. that generate foreign revenues than vice versa. That is, income is expected to be recognized in the location where economic value is added to the goods and services; for U.S. firms, we expect that value-adding activities are more likely to be performed inside the U.S. than outside the U.S. (Barefoot and Mataloni 2011). Thus, we are likely to observe asymmetrically large amounts of inbound transfers (relative to outbound transfers) that are driven by compliance with the arm's-length standard.

2.3. How is income shifting accomplished?

The goal of income shifting is straightforward: to have income taxed at a low tax rate instead of at a high tax rate. Income is revenues less expenses, so shifting can also be thought of as moving revenue to low-tax jurisdictions and expenses to high-tax jurisdictions.[11] This can be accomplished using many different mechanisms. Section 4.11.5.2 of the Internal Revenue Manual (IRM) notes at least six types of transactions that can lead to income shifting: 1) intracompany loans, 2) intracompany services, 3) intracompany leases of property, 4) intracompany sales of property, 5) intracompany leases of intangible property, and 6) cost

[10] For example, consider a U.S. firm that develops a new product in the U.S. and builds and sells it to French customers through a French subsidiary. In this case, development is in the U.S. while production and sale are in France. When the French subsidiary compensates the U.S. parent for the right to build and sell the product to customers in France, the payment creates earnings in the U.S. even though all revenues related to the product are in France. Thus, even when the amount of such a payment is in compliance with the arm's length standard, an association is created between foreign sales and domestic income. We capture that association as inbound transfers because the location of the revenue is different from the location of some of the income (i.e., some foreign income is transferred to the U.S., where the costs of original development were incurred).

[11] Even in the presence of opportunities to shift, income shifting can be characterized as minimizing total tax payments subject to constraints such as increases in the probability of audit, possible penalties, interest, etc.

sharing arrangements. Although the IRM notes that "…establishing specific guidelines for every type of factual pattern is impractical", the Treasury Regulations recorded in Section 1.482 of the Code of Federal Regulations provide official guidance on how IRC Section 482 should be applied in various situations, including those mentioned in the IRM. Because our primary concern is whether income shifting occurs, and not precisely how it occurs, we include only a broad discussion the most common types of mechanisms here and refer the interested reader to a more detailed discussion and numerous examples in Treasury Regulations 1.482.[12]

First, firms set the prices of goods or services transferred between controlled entities located in different jurisdictions. Most countries require transfer prices between related parties to be set using the arm's-length principle (i.e., as if the transfer were between unrelated parties). However, incentives may drive firms away from a neutral application of the arm's-length transfer pricing principle, thereby allowing them to shift marginal income to the location most favorable to achieving their objectives by setting prices for intracompany transfers of goods and services at something other than what would be expected if the transacting parties were unrelated.

Second, firms can shift profits using intra-company debt. Once again, a neutral allocation of intra-company debt might be integral to the effective functioning of internal capital markets. But, just as is the case with transfer pricing, firms can strategically arrange their finances such that income is disproportionately recognized in jurisdictions favorable to the company's objectives. For example, a subsidiary located in a low-tax country might lend to a related subsidiary in a high-tax country. The subsidiary in the high-tax country can then make tax-

[12] The Treasury Regulations we refer to are available online at: https://www.law.cornell.edu/cfr/text/26/1.482-0.

deductible interest payments to the subsidiary in the low-tax country, where the interest income is earned at the low tax rate.

Third, firms can shift income using cost-sharing agreements. A cost-sharing agreement is a contract between related parties specifying how they will share the costs of developing intangible assets, and how they will arrange the rights to exploit the intangible assets once developed. For example, if a parent firm in a high-tax country spends $10 million developing a new asset that is expected to increase its domestic annual earnings by $8 million and is also expected to increase the annual earnings of a foreign subsidiary in a low-tax country by $4 million, the agreement might specify that the subsidiary will reimburse the parent for one-third (4/(8+4)) of the costs of development, and in exchange, the foreign subsidiary will obtain the right to exploit the new asset in foreign markets without making royalty payments to the domestic parent. De Simone and Sansing (2015) show that, under fairly general conditions, cost-sharing agreements enable firms to exploit intangible assets strategically such that profits are systematically over-recorded in low-tax jurisdictions and under-recorded in high-tax jurisdictions.

Finally, income can be shifted to lower tax jurisdictions by transferring intellectual property (the "IP" referred to in the quote from Patrick Driessen in the previous section), items such as patents and licensing agreements, to low-tax countries. An example of this is the recent transaction undertaken by Etsy, a U.S.-based online marketplace for artisans. Just ahead of its initial public offering, Etsy transferred intellectual property from the U.S. (tax rate 35%) to Dublin, Ireland (tax rate 12.5%) (Kapner 2015). Once that IP is in Ireland, the revenues it

generates can be recorded and taxed in Ireland, saving Etsy 22.5 cents of U.S. tax on each dollar earned.[13]

Regardless of the mechanism used to shift income, a firm cannot unilaterally change the location of its third-party customers. We exploit this fact, and take the amount of domestic sales made to third-party customers inside the U.S. and the amount of foreign sales made to third-party customers outside the U.S. as exogenous. What the firm chooses, through its transfer pricing practices, the location of its debt, the location of its IP, and the structuring of its cost-sharing agreements, is the amount of income that will be reported (and taxed) as domestic and the amount that will be reported (and taxed) as foreign. That is, our income transfer parameters capture *all* types of activities that decouple the geographic location of sales from the geographic location of income, regardless of form or substance. Because the choice of where to locate income is binary (foreign or domestic) and the total amount of consolidated income is unaffected by income transfers, any decrease in domestic income must result in a dollar-for-dollar increase in foreign earnings, and vice versa.

2.4. Financial constraints

The concept of financial constraints that we have in mind is when the firm faces high costs of external financing or, in the extreme, does not have access to external funds. In our sample of U.S. multinationals, we are specifically interested in identifying those firms whose financial constraints are in the U.S. because it is the need for cash at home that forces

[13] Two important additional points about this transfer of IP: 1. Because the transfer of the IP must comply with the arm's length standard as specified under Section 482, Etsy would pay U.S. tax as a result of this transfer. As with cost-sharing agreements, the taxpayer's goal is to value the IP as low as possible. 2. The 22.5 cents are technically deferred rather than saved, since the income of the Irish subsidiary is taxable in the U.S. if and when it is repatriated to the U.S. parent as a dividend.

repatriation of foreign earnings and reduces the returns to outbound shifting under the worldwide taxation system. To the extent that we can capture domestic financial constraints, we will be identifying those firms that are unable to take advantage of the deferral provision in the U.S. tax law.[14]

3. Related Research and Hypothesis Development

3.1. Prior research

3.1.1. Income shifting

A number of studies in economics (Harris et al. 1993, Hines and Rice 1994, Huizinga and Laeven 2008) and accounting (Klassen et al. 1993, Collins et al. 1998, Klassen and Laplante 2012a and 2012b) have examined tax-motivated income shifting across international borders by multinational corporations. Most of these studies estimate income shifting using variations on one of two approaches, introduced by Hines and Rice (1994) and Collins et al. (1998), respectively. Hines and Rice (1994) assume that unobservable pre-shifted income in a jurisdiction is a function of the jurisdiction's labor, capital, and productivity inputs to a Cobb-Douglas production function; to the extent that reported income varies with a tax incentive variable, incremental to the labor, capital, and productivity inputs, income shifting is inferred. One weakness of this measure is that labor, capital, and productivity in a country could systematically vary with tax incentives in that country, and so the separation of the economic factors from the tax factors becomes problematic. In addition, the method was developed for analysis at the jurisdiction level, and there are some challenges associated with its adaptation to the firm level, including the necessity of excluding loss observations.

[14] Data constraints prevent us from calculating proxies for financial constraints specific to jurisdictions (U.S. vs. foreign). We discuss our proxies for financial constraints in section 6.2.

One recent innovation on the Hines and Rice (1994) model at the firm level is developed by Dharmapala and Riedel (2013). They map shocks to parent profits through the firm to the subsidiary level, and find that the shocks to profits are most likely to be reported in countries with relatively low tax rates.[15] We adopt the idea of using shocks to help identify income shifting when we develop our model in Section 4.

Collins et al. (1998) take a different approach and assume that the accounting pre-tax rate of return on foreign sales should be a constant linear function of the return on worldwide sales in the absence of income shifting. In their model, if the return on sales in foreign jurisdictions is explained by tax incentives, after controlling for the worldwide return on sales, then income shifting is inferred.[16] One weakness of this approach, similar to that of the Hines and Rice (1994) approach, is that rates of return on sales could be systematically related to tax incentives, so a higher rate of return on sales in foreign countries may have more to do with the economics of foreign markets and less to do with cross-jurisdictional income shifting. Another weakness of this approach is that inbound and outbound shifting can only be inferred based on each firm's overall tax incentive, which precludes the possibility that one firm shifts income both into and out of the U.S. If firms actually shift income both in and out, the Collins et al. (1998) approach allows them to contribute only in the direction that dominates.[17]

[15] Dharmapala and Riedel (2013) construct shocks to parent profits by comparing reported profits to expected profits, where expected profits are calculated using the data of peers in the same industry and country.
[16] Another approach, introduced by Christian and Schultz (2005), is similar to that of Collins et al. (1998) but assumes that the marginal after-tax rate of return on assets should be the same in all jurisdictions. This approach requires access to tax return data and has not been used in other studies of which we are aware.
[17] Collins et al. (1998) find evidence that U.S. multinationals operating in high-tax countries shift income into the U.S.; they do not find evidence that those operating in low-tax countries shift income out of the U.S. Klassen and Laplante (2012b) refine the research design of Collins et al. (1998) by aggregating data over 5 years and find evidence of shifting by both groups.

Although a number of studies have used these techniques to measure income shifting, relatively little is known about the variation in the degree of income shifting across firms beyond the fact that the level of shifting is related to tax incentives. What has been examined is the tax avoidance behavior of firms associated with one or more indirect proxies for income shifting and various firm characteristics. For example, Dyreng and Lindsey (2009) and Markle and Shackelford (2012) find that tax haven operations reduce firms' effective tax rates. Furthermore, Desai et al. (2006) find that firms with a greater degree of multinationality, more extensive intrafirm trade, and more intense research and development activities have more operations in tax haven countries. Presumably, tax havens reduce tax rates because firms use them in income shifting strategies. However, the existing evidence supporting this conjecture is indirect.

Klassen and Laplante (2012a) and Markle (2015) attempt to identify factors that affect the degree of income shifting. Both studies find that firms with better foreign reinvestment opportunities shift more income.[18] As is the case with all empirical studies, these studies are bound by the limitations of the empirical proxies they use for income shifting (the Collins et al. (1998) proxy, and the Hines and Rice (1994) proxy, respectively).

3.1.2. Financial Constraints

While there are many studies of financial constraints in the extant literature (e.g., Fazzari et al. 1988, Kaplan and Zingales 1997, Whited and Wu 2006, Hadlock and Pierce 2010, Farre-Mensa and Ljungqvist 2013) we are aware of only three studies that examine the interplay of financial constraints and tax incentives. First, Albring et al. (2011) examine whether the financial constraints of U.S. multinationals affected the firms' responses to a temporary

[18] Klassen and Laplante (2012a) use a U.S.-only sample, so all firms are subject to a worldwide tax regime. Markle (2015) uses a sample of multinationals in several countries and finds that reinvestment opportunities affect the shifting of worldwide firms, but not that of territorial firms.

repatriation tax holiday in 2004 and find that less constrained firms repatriated more cash during the holiday. The authors infer from this result that the less constrained firms had more flexibility to time their repatriations to take advantage of the holiday. This finding is consistent with what we find in that the financial constraints of a firm are found to reduce its ability to engage in tax-minimizing behavior.

Two concurrent papers, Edwards, Schwab, and Shevlin (2015) and Law and Mills (2015), find that firms engage in more tax planning when they become more financially constrained. Specifically, they document a negative association between proxies for tax planning (e.g., cash effective tax rate, unrecognized tax benefits) and proxies for financial constraints, controlling for other factors previously shown to affect tax planning. On the surface, these results appear inconsistent with ours. However, there are fundamental differences between the research questions in this paper and those in Edwards et al. (2015) and Law and Mills (2015). Those studies hypothesize that an inter-period increase in the financial constraints of a firm will motivate it to try to retain more cash by taking more aggressive tax positions. Edwards et al. (2015) assert that the mechanisms that firms would use to achieve these cash tax savings would likely be deferral strategies and they include an appendix listing some specific mechanisms (e.g., accelerating bad debt deductions, writing down damaged goods). Most of the mechanisms on their list are things that can be changed relatively nimbly. Outbound income shifting is notably not on this list, and this highlights the key difference between our study and Edwards et al. (2015) and Law and Mills (2015): unless shocks to financial constraints are expected to be relatively permanent, firms are unlikely to set up the costly structures necessary to shift income out of the U.S., even though they might increase their use of other, more nimble, tax strategies as suggested in Edwards et al. (2015). Because income shifting is difficult to initiate and terminate

over short periods of time, we make no prediction for how a U.S. multinational's income shifting will change in response to temporary inter-period changes in its level of financial constraint.

3.2. Validity check: the effect of tax incentives

Because we are building on this body of research and introducing a new method for measuring income shifting, we first run a series of tests to validate the measure by confirming that it yields results consistent with those in prior research on the effect of tax incentives on income shifting. Based on prior research, we expect to find that firms shift income in response to tax incentives. Using our measure, we expect that shifting in response to tax incentives will be incremental to the cross-border transfers that are driven by innate factors.

3.3. Hypothesis: the effect of financial constraints

The most direct motivation for our hypothesis comes from concurrent research by Klassen et al. (2014) which develops a theoretical model of the income shifting behavior of U.S. multinationals. Their model predicts that income shifting to a low-tax subsidiary will be reduced when a higher required rate of return makes repatriation of the shifted income optimal. Because financial constraints lead to a higher required rate of return, we predict that financially constrained firms will shift less income out of the U.S. than unconstrained firms.[19] The intuition for this prediction derives from the fact that U.S. multinationals are subject to a worldwide tax regime in which every dollar of income earned throughout the world is eventually subject to taxation in the U.S. In a simple worldwide tax system, there should be no returns to shifting income out of the U.S. because any income taxed at a lower rate by the foreign country would also be taxed by the U.S., with the end result of every dollar of income being taxed at a minimum

[19] There could be other costs that affect the required rate of return and affect income shifting that we do not focus on in this study (e.g., financial reporting costs, political costs).

of the U.S. rate. However, the U.S. system allows firms to defer the payment of the residual U.S. tax until the foreign income is repatriated to the U.S. in the form of a dividend. It is this deferral provision that provides the benefit to shifting income out of the U.S.

There are also costs to income shifting, some of which are fixed and others that vary with the amount of income shifted (Huizinga and Laeven 2008). These costs could include: 1) initial setup costs wherein firms make buy-in payments for cost-sharing agreements or initial investments in foreign manufacturing facilities, or negotiation of agreements with governments in multiple jurisdictions; 2) compliance costs, such as transfer pricing risks created as foreign countries negotiate with each other and the firm to lay claim on the firm's resources; 3) administrative costs, including coordination costs, legal and governance complications, political uncertainty, and so on. It is assumed that firms consider all costs and benefits in determining whether to shift income out of the U.S., and that they choose to shift if the expected benefits outweigh the expected costs.

If a firm is financially constrained, such that high borrowing costs prevent it from obtaining other sources of financing in the U.S., it may be forced to repatriate foreign income. If this is the case, the firm will forgo all of the tax benefits of shifting (i.e., deferral), but will still bear the variable costs. In this situation, shifting income out of the U.S. would be less valuable than it would be to a firm that can defer repatriation of foreign earnings. The scales would tip even further if the financially constrained firm had not yet borne the initial fixed setup costs of shifting. Thus, we predict:

Hypothesis: Financially constrained U.S. multinational corporations shift less income out of the U.S. than financially unconstrained firms.

There is support for the null hypothesis (i.e., that financial constraints will not affect outbound shifting) in anecdotes documenting situations in which U.S. multinationals have found ways to get foreign cash back to the U.S. without incurring repatriation taxes. For example, Hewlett Packard used a series of short-term loans to circumvent the rule that treats a loan from a foreign subsidiary to a U.S. parent as a dividend (and, thus, a repatriation) to get some of its foreign cash back to the U.S. (Novack 2012). The Wall Street Journal reports that GE, Sonoco, and other companies also use the strategy. In the article, Sonoco's head of investor relations, Roger Schrum, was quoted as saying "Many, if not most, companies with similar opportunities do the same thing, although they are probably less diligent in disclosing it" (Linebaugh 2013). To the extent that such strategies are widely available and sustainable, we may fail to find support for our hypothesis.

The predicted effect of financial constraints on inbound income shifting is not expected to be the same as that on outbound income shifting. If a firm has tax incentives to engage in inbound income shifting, it will do so, regardless of its financial constraints. If the firm has tax incentives to leave the earnings abroad, but needs the cash at home because of financial constraints, it has two choices. First, it could pay tax to the foreign country and then issue a dividend to the parent, paying tax to the U.S. on the difference between the foreign country tax rate and the U.S. tax rate. Second, it could engage in inbound income shifting, in which case it would pay the U.S. tax rate. In either case, the firm incurs the same tax burden. Hence, it is unlikely that financial constraints interact with the tax incentives to engage in inbound income shifting. This intuition is confirmed in the theoretical model of Klassen et al. (2014), which predicts that inbound income shifting is unaffected by the required rate of return.

4. Research Design

In this section, we describe the research design used to test our hypothesis. In subsection 4.1 we describe the statistical technique we use to estimate income shifting. In subsection 4.2 we describe how we separate tax-motivated income shifting from baseline cross-border income transfers.

4.1. Estimating income shifting

To test our hypothesis, we develop an approach that is distinct from those used in prior research. First, consider the following simple identities:

$$PIFO^* = SALEFO^* - EXPFO^*, \quad (1a)$$

$$PIDOM^* = SALEDOM^* - EXPDOM^*, \quad (1b)$$

where $PIFO^*$ ($PIDOM^*$) is unobservable pre-transfer foreign (domestic) pretax earnings, $SALEFO^*$ ($SALEDOM^*$) is foreign (domestic) sales to third parties, and $EXPFO^*$ ($EXPDOM^*$) is expenses incurred to generate foreign (domestic) sales to third parties.[20] Note that $EXPFO^*$ and $EXPDOM^*$ are aggregated based on where the sales to which they relate are made, not based on where the expenses are actually incurred. Eq. (1a) and (1b) can be rewritten as:

$$PIFO^* = \rho_f SALEFO^*, \quad (2a)$$

$$PIDOM^* = \rho_d SALEDOM^*, \quad (2b)$$

where ρ_f is the return on sales for pre-transfer foreign income and ρ_d is the return on sales for pre-transfer domestic income.

The purpose of our study is to estimate how much income is transferred across international borders (i.e., what portion of $PIFO^*$ ($PIDOM^*$) is ultimately reported as domestic (foreign) income). To examine this question, we modify Eq. (2a) and (2b) as follows:

[20] In all equations, * on a variable name indicates pre-transfer.

$$PIFO = (1-\gamma)\rho_f SALEFO^* + \theta\rho_d SALEDOM^*, \quad (3a)$$

$$PIDOM = \gamma\rho_f SALEFO^* + (1-\theta)\rho_d SALEDOM^*, \quad (3b)$$

where $PIFO$ and $PIDOM$ are reported (post-transfer) foreign and domestic pretax earnings, respectively; γ is the fraction of pre-transfer foreign pretax earnings that is transferred to reported domestic pretax earnings; θ is the fraction of pre-transfer domestic pretax earnings that is transferred to reported foreign pretax earnings. Note that γ and θ capture all types of income transfers (including those necessary to comply with the arm's length standard). The intuition behind Equation (3a) is that reported pretax foreign earnings will be the sum of pretax foreign earnings not transferred and pretax domestic earnings transferred.[21]

Eq. (3a) and (3b) are empirically estimable. U.S. accounting standards require firms (when practicable) to disclose "revenues from external customers (1) attributed to the enterprise's country of domicile and (2) attributed to all foreign countries in total from which the enterprise derives revenues."[22] In spite of this relatively clear guidance, the overall theme in the standard is that firms should use the "management approach" in preparing segment disclosures. Under this approach, management reports segment performance consistent with how the firm is organized for making operating decisions and assessing performance. We reviewed one 10K filing for each of our sample firms to see how they describe their geographic sales disclosures and found that many explicitly state that geographic revenues are based on the location of third-

[21] The Hines and Rice (1994) model assumes that income is generated by a log-linear function of labor, capital, and productivity that is the same across all jurisdictions. The Collins et al. (1998) model, as applied by Klassen and Laplante (2012b) assumes that allocation of income across jurisdictions should be consistent with the allocation of assets, and uses revenue as the proxy for assets. This approach does not allow rates of return to differ across groups of firms with different tax incentives. Our model imposes a less restrictive functional form on the income-generating process, allows the rate of return on sales to vary across jurisdictions and cross-sectionally with firm-level characteristics, and uses primitives rather than proxies as inputs. We simply calculate the associations between domestic sales and foreign income and foreign sales and domestic income to arrive at our estimates.

[22] Statement of Financial Accounting Standards No. 131, June 1997.

party customers. For example, Apple Inc. reports, "Net sales for geographic segments are generally based on the location of customers", Illinois Tool Works, Inc. reports, "Operating revenues by geographic region are based on the customers' location", and Google, Inc. reports that "domestic and international revenues [are] determined based on the billing addresses of our advertisers." Overall, 41% of our sample explicitly state that sales are based on the location of customers, 39% were not explicit, and the remaining 20% explicitly stated that sales are reported using some other basis (location of selling subsidiary, location of asset that generated the sale, etc.). Later, we discuss the implications of this finding and show that our conclusions are unaffected by the variation in how sales are allocated. For now, we proceed under the assumption that sales are reported in the geographic location of the customer.

In contrast to foreign and domestic sales reported in geographic segment disclosures, foreign and domestic pretax earnings, required by the SEC to be disclosed in the income tax footnote, are not reported based on the location of customers generating the earnings. Instead, the pretax earnings numbers are based on the domicile of the legal entity in which the earnings are reported (i.e., post-transfer).[23] This important difference between the income numbers and the revenue numbers (Donohoe et al. 2012) allows us to estimate Eq. (3a) and (3b).

To estimate the model, we transform the variables to changes and add an intercept and an error term. This modification is in the spirit of Dharmapala and Riedel (2013), who use earnings shocks to identify income shifting. Although this modification uses changes in sales and income to estimate the transfer parameters, it does not generate income transfer parameters that capture the change in income transfers. Instead, the interpretation of the parameters is slightly modified such that the return on sales parameters (ρ_d and ρ_f) become estimates of the marginal return on

[23] See SEC Reg. S-X, Rule 4-08(h).

sales as opposed to the total return on sales because fixed costs are factored out of the equation and the transfer parameters, (γ and θ), represent the fraction of the shock to income that is transferred, not the fraction of all income. Subsequent cross-sectional comparisons are what allow the model to be used to test for the determinants of income shifting. We estimate:

$$\Delta PIFO = \alpha_0 + (1-\gamma)\rho_f \Delta SALEFO^* + \theta\rho_d \Delta SALEDOM^* + \epsilon, \quad (4a)$$

$$\Delta PIDOM = \beta_0 + \gamma\rho_f \Delta SALEFO^* + (1-\theta)\rho_d \Delta SALEDOM^* + u.^{24} \quad (4b)$$

All variables are as defined previously and Δ indicates a first difference. We estimate the equations as a system to obtain estimates the outbound and inbound shifting parameters (θ and γ) and the return on sales parameters, (ρ_d, and ρ_f). The transfer parameters (θ and γ) are econometrically separated from the return on sales parameters (ρ_d and ρ_f), eliminating one issue that has been problematic in prior efforts to estimate cross-jurisdictional income shifting.

An important difference between our approach and that of Collins et al. (1998) is that ours yields an estimate of both the inbound and outbound shifting of the average firm-year while theirs classifies each firm-year as a net in-shifter or a net out-shifter and infers that income shifting has occurred from an association with a proxy for tax incentive. Consider a U.S. multinational that operates in the U.S. (35% tax rate), Japan (42%), and Bermuda (0%). The Collins et al. (1998) approach would divide the total (post-shifting) foreign tax expense by the total (post-shifting) foreign pretax income and if that quotient was greater than 35%, it would predict that firm's foreign return on sales would be lower than expected due to net inbound

[24] Because Eq. (4a) and (4b) contain exactly the same independent variables, OLS regressions are equivalent to seemingly unrelated regressions. We use seemingly unrelated regressions in the empirical tests because this allows us to separate the shifting parameters and the return on sales parameters, with associated test statistics in a single stage estimation. The models can be estimated using the *nlsur* command in STATA or the *proc model* command in SAS. In the appendix we describe several different techniques that can be used to obtain parameter estimates.

shifting. In reality, it is possible that the firm shifted some of its Japanese income to the U.S. and shifted some of its U.S. income to Bermuda. Our approach enables us to estimate both pieces.

Another advantage of our empirical methodology is the adding-up constraint that it imposes; because we are using consolidated financial statement information, each dollar of shifted income must either originate in the U.S. and be shifted to foreign or originate in foreign and be shifted to the U.S.[25] Most prior studies using existing methodologies (e.g., Collins et al. 1998, Huizinga and Laeven 2008) do not impose an adding-up constraint, which can end with the result that a firm's total post-shifted income is greater (or less) than its total income. Although Huizinga and Leaven (2008) impose an adding-up constraint in their analytic model, their empirical estimations do not. Moreover, most studies that use variations on the methodology they develop also do not impose an adding-up constraint in their empirical tests (e.g., Markle 2015). The adding-up constraint in our study is similar to the earnings management estimation technique developed by Dechow et al. (2012) which assumes an adding-up constraint in accruals over time.[26]

4.2. Cross Sectional Variation in Model Parameters

Our primary objective in this study is to examine how the outbound transfer parameter θ varies in response to financial constraints. It is also possible that the inbound transfer parameter, γ, varies in response to certain incentives. Thus, the parameters can be written as:

$$\theta = \theta_0 + \theta_1 X, \tag{5a}$$

[25] This would not necessarily be the case if we were using tax return data. Since different jurisdictions define taxable income differently, it is possible for a dollar of income to be reported (taxed) multiple times or not at all. As with all studies that use financial statement data as a proxy for tax return data, we are assuming that instances of double-taxation and non-taxation are not common enough to affect inferences.

[26] In our setting, the adding-up constraint is in total income and across jurisdictions within a given time period, as opposed to in accruals and across time periods as in their setting.

$$\gamma = \gamma_0 + \gamma_1 X, \tag{5b}$$

where X represents a variable used as a proxy for whether or not the firm is financially constrained. In these expressions, θ_0 (γ_0) represents average outbound (inbound) transfers, and θ_1 (γ_1) captures the incremental effect of the proxy X on outbound (inbound) transfers. Thus, our hypothesis can be tested by examining whether θ_1 is negative.

The return on sales parameters (ρ_d and ρ_f) could also vary systematically with tax incentives or financial constraints, and failure to control for such systematic variation could contaminate the estimates of the transfer parameters. That is:

$$\rho_d = \rho_{d_0} + \rho_{d_1} X, \tag{5c}$$

$$\rho_f = \rho_{f_0} + \rho_{f_1} X, \tag{5d}$$

where X represents a variable used as a proxy for the firm's tax incentives to shift income, or a variable used as a proxy for whether or not the firm is financially constrained (the same as in Eq. 5a and 5b).

As noted by Khan and Watts (2009), who use a similar technique to examine cross-sectional variation in conservatism parameters, the expressions in Eq. 5a, 5b, 5c, and 5d are not regression equations, but can be substituted into Eq. 4a and 4b. This is similar in spirit to other research in accounting that allows a parameter of interest to vary in cross-sectional regressions.[27] We show the resulting expressions, along with information on how to estimate the parameters, in the Appendix.

[27] Examples in accounting research include Collins and Kothari (1989), Khan and Watts (2009), Dyreng et al. (2012), and Dyreng and Lindsey (2009), among others.

5. Data and Sample Selection

The financial statement data used in our study are obtained from Compustat. The breakdown of sales between foreign and domestic is obtained from the segment data within Compustat. The breakdown of pretax earnings between foreign and domestic is also obtained from Compustat, and corresponds to data disclosed in firms' financial statement footnotes related to income tax expense. The data for coding the tax haven variable ($HAVEN$) are obtained from Exhibit 21 of each firm's 10K using the method described in Dyreng and Lindsey (2009). S&P bond ratings are obtained from Compustat.

5.1. Sample

Our sample consists of U.S.-incorporated multinational firms having foreign and domestic sales and foreign and domestic pretax income available in the Compustat files between the years 1998 and 2011. We delete observations where the sum of foreign and domestic sales is not within 1% of total sales or the sum of foreign and domestic pretax income is not within 1% of total pretax income.[28] Furthermore, we delete observations with very small values of foreign or domestic sales (less than $1 million of either value). We begin our sample after 1997 because two significant changes occurred in that year: the rules for segment disclosures (FAS 131) changed and new international tax reporting requirements (the so-called "check-the-box" rules) were introduced that year.[29] The sample ends in 2011 because that was the most recent year of

[28] This requirement also eliminates all observations that use an intracompany eliminations account for geographic segments. Some companies record intra-company sales in segment data (as opposed to sales to third-party customers), and then use an intracompany eliminations account to prevent double counting sales. We delete these observations because they do not fit the requirements of our empirical model.

[29] FAS 131 introduced the requirement for firms to disclose the financial accounting results of segments separately. The "check-the-box" rule allows U.S. multinationals to elect to treat their foreign subsidiaries as flow-through entities for U.S. tax purposes. The adoption of this rule in 1997 significantly increased the international tax planning opportunities of U.S. multinationals, and is at the heart of many international tax strategies, including the commonly referenced "Double Irish" tax strategy (Pesta and Barner 2015).

available data on Compustat when we began the study. We require firms to have non-missing values of total assets, and at least two consecutive years of non-missing values of pretax foreign income and pretax domestic income. We eliminate flow-through entities (partnerships, LLCs, trusts, etc.) because they are not subject to entity-level taxation, financial institutions (SIC codes between 6000 and 6999) because their revenue is substantially different from that of industrial firms, and utilities (SIC codes between 4900 and 4999) because they are subject to substantially different regulatory environments.

Not all pretax earnings are generated by sales to third-party customers as depicted in Eq. (1a) and (1b). Non-operating gains and losses can also affect pre-tax earnings. For example, firms may have revenues from financial instruments that create pretax income, or they may record gains or losses on the disposition of assets, etc. Because foreign and domestic pretax incomes before non-operating gains and losses are not available, we delete observations from our sample that have relatively large interest revenues or special items and other non-operating income (either item in excess of 10% of sales). A summary of the sample selection criteria is presented in Table 1.

To ensure that our estimates of income shifting are not driven by a very few influential observations, we eliminate any observation that has a Cook's Distance outlier statistic in the top 2% of the sample in each model we estimate.[30] We use 2% because this is roughly equivalent to truncating observations at the 1st and 99th percentiles, but the results are not sensitive to the exact percentage. We use this procedure to correct for outliers instead of winsorization or truncation of the top and bottom percentiles of our variables because Leone et al. (2013) show that these

[30] We calculate Cook's Distance for each equation in the model. Thus, the number of observations actually deleted ranges from 2% to 4%.

techniques can lead to biased results. As a result of our outlier corrections, the number of observations fluctuates slightly from model to model.[31]

Table 2 presents summary statistics for the sample just described. In Panel A we show the univariate summary statistics. The first two rows show the change in foreign pretax income scaled by average assets ($\Delta PIFO$) and the change in domestic pretax income scaled by average assets ($\Delta PIDOM$), which are the two dependent variables used to estimate Eq. (4a) and (4b). On average, firms in our sample have year-over-year increases in foreign pretax income (domestic pretax income) of about 0.7% (1.5%) of assets. The next two rows show the change in foreign sales scaled by average assets ($\Delta SALEFO$) and the change in domestic sales scaled by average assets ($\Delta SALEDOM$). Sales in both foreign and domestic locations are increasing by about 4% of assets at the mean (3% of assets at the median). Next we examine our three proxies for financial constraints. The $JUNK\ RATING$ variable is equal to one (indicating a non-investment grade rating) for about 46% of firms that have ratings. $SA\ INDEX$ is equal to one for the most constrained tercile of firms using the index computed following Hadlock and Pierce (2010), which is a nonlinear function of firm age and firm size. $NODIVIDENDS$ is equal to one if the firm is in the lowest dividend-paying tercile, which essentially results in a variable that captures firms with no dividends.[32] Our proxies for testing the effect of foreign tax rates on income shifting are the next two variables in the table. About 65% of our firm-years report at least one subsidiary in a tax haven country ($HAVEN$), and the average firm faces a U.S. statutory tax rate

[31] Leone et al. (2013) recommend using iteratively reweighted least squares for outlier correction. However, it is unclear how to implement iteratively reweighted least squares in non-linear seemingly unrelated regression. However, using outlier statistics as we do is similar in spirit to iteratively reweighted least squares in that observations identified as having large values of Cook's Distance are effectively given a weight of 0 in the regression.

[32] The mean is not equal to 33% because all firms with no dividends get assigned to the lowest tercile.

that is 1.8 percentage points higher than the foreign effective tax rate ($FTR5$).[33] The other variables listed in Table 2 are described later when we use them in additional tests.

Panel B shows the Spearman (below the diagonal) and Pearson (above the diagonal) correlations among the variables used in the tests of our two hypotheses. The change in foreign income is positively correlated with the change in domestic income, indicating that foreign and domestic incomes are not independent. We also see that the change in domestic sales is positively correlated with the change in foreign income, and that the change in foreign sales is positively correlated with the change in domestic income. These two correlations suggest that income shifting across jurisdictions is a possibility, though the multivariate tests specified by Eq. (4a) and (4b) are needed for confirmation. We also note that the three proxies for financial constraints are positively correlated, with Spearman correlation values ranging between 25% and 42%.

6. Results

In this section, we discuss the results of the tests of the validity of our measure of income shifting and of our hypothesis. In subsection 6.1 we discuss our baseline model. In subsection 6.2 we check the validity of our income shifting measure, and in subsection 6.3, we discuss the results of our tests of our hypothesis. In subsections 6.4 – 6.6, we describe various sensitivity analyses. In subsection 6.7, we provide estimates of the dollars shifted out of the U.S. and the taxes deferred. In the final subsection, we discuss policy implications of our findings.

6.1. Baseline model

[33] We follow Dyreng and Lindsey (2009) in identifying which countries are tax havens.

In Table 3, Model 1, we report the results when estimating the model with no control variables included to examine cross-sectional variation in the income transfer and return on sales parameters. That is, Model 1 reports results from estimating the system of equations Eq. (4a) and (4b). No controls are included on either the transfer parameters (θ and γ) or the return on sales parameters (ρ_d and ρ_f), so each coefficient estimate is the unconditional mean effect of each parameter. The coefficient on θ, our outbound transfers parameter, is 0.079, indicating that the average firm transfers 7.9% of its pre-transferred domestic income out of the U.S. The estimate for γ is 0.412, meaning that the average firm transfers 41% of its pre-transferred foreign income in to the U.S. The estimates on ρ_f and ρ_d are 0.145 and 0.079, respectively, indicating that the marginal return on foreign sales for the average firm in our sample is nearly twice as high as its domestic return on sales.

As expected, the estimate of γ, which captures inbound income transfers, is substantially higher than the estimate of θ, which captures outbound income transfers. There are at least three reasons to expect this amount to be large. First, compliance with arm's-length transfer pricing standards will result in income transfers towards the location in which economic value is added, and prior research shows that more than two-thirds of the value added of U.S. multinationals is in the U.S. (Barefoot and Mataloni 2011). Second, all sales made through directly-owned foreign branch operations (as opposed to separately organized legal subsidiaries) will be captured as inbound income transfers. Third, all exports of goods directly to foreign customers will be captured as inbound transfers.

6.2. Validation check – Tax incentives and income shifting

We report tests of the validity of our new measure of income shifting in Table 3, Models 2-5. Prior research has shown that outbound transfers should be higher for firms that face lower

tax rates in foreign countries. In Model 2 we use $HAVEN$ as the proxy for tax incentive. The results presented in Model 2 show that the incremental effect of $HAVEN$ on outbound transfers (θ_{HAVEN}) is 0.113 (p-value < 0.001), suggesting that firms with operations in at least one tax haven country have an outbound transfer parameter that is 0.113 greater than firms without operations in at least one tax haven country. The effect of *HAVEN* on inbound transfers (γ_{HAVEN}) is not statistically significant.[34]

One potential criticism of the estimates in Model 2 is that if firm-level characteristics other than $HAVEN$ affect the firm's return on sales, then the transfer estimates may not be effectively separated from the return on sales parameters. To address this concern, we expand the vector of variables allowed to affect ρ_f and ρ_d so that it includes additional controls. We control for $WW\ RETURN\ ON\ SALES$ (to control for overall profitability that is unaffected by income shifting), $R\&D\ EXPENSE$, $ADVERTISING\ EXPENSE$ and the ratio of $INTANGIBLE\ TO\ TOTAL\ ASSETS$ (to control for profitability differences that might arise due to intangibility of the firm's assets), the ratio of $FOREIGN\ TO\ TOTAL\ SALES$ (to control for the possibility that more multinational firms enjoy systematically different rates of profitability on foreign and domestic sales), the ratio of $CASH\ TO\ ASSETS$ (to control for the possibility that firms with substantial cash holdings have systematically different rates of return, possibly because they can achieve more favorable rates of financing), the ratio of $DEBT\ TO\ ASSETS$ (to control for the possibility that leverage could be associated with financial sophistication, which could affect rates of returns), and $LOG\ ASSETS$ (to control for generic differences in rates of profitability among firms of different sizes). In sum, in Model 3, $\rho_f = \rho_{f_0} + \sum_c \rho_{f_c} C$, and $\rho_d =$

[34] Standard errors are clustered by firm and by year in all tests, unless otherwise noted.

$\rho_{d_0} + \sum_c \rho_{d_c} C$, where *C* is the vector of variables just listed.

After including these additional control variables, we find that the incremental effect of $HAVEN$ on outbound transfers (θ_{HAVEN}) is 0.064 (p-value = 0.025), suggesting that firms with operations in at least one tax haven country have an outbound transfer parameter that is 0.064 greater than firms without operations in at least one tax haven country. We also report that the effect of $HAVEN$ on inbound transfers (γ_{HAVEN}) is -0.058 (p-value = 0.059), suggesting that firms with tax haven operations transfer marginally less income into the U.S. than firms without tax haven operations.

The correlation between $HAVEN$ and $LOG\ ASSETS$ reported in Table 2 is 0.38, raising the possibility that our proxy for tax incentive is instead capturing the effect of firm size. To mitigate this concern, we repeat the exercise, but instead use *FTR5* (defined as $0.35 - \frac{\sum_5 TXFO}{\sum_5 PIFO}$, and correlated with $LOG\ ASSETS$ at 0.09) as the tax incentive variable. Model 4 reports results without additional controls on the return on sales parameters (ρ_f and ρ_d), and Model 5 reports results when those controls are included. Looking at Model 4, we find that the incremental effect of $FTR5$ on outbound transfers (θ_{FTR5}) is 0.233 (p-value = 0.035), consistent with our expectations. Since $FTR5$ is a continuous measure, the magnitude of the coefficient suggests that as $FTR5$ increases one standard deviation, outbound transfers increase by 0.045. In Model 4, the incremental effect of $FTR5$ on inbound transfers (γ_{FTR5}) is negative, but not statistically different from zero.

In Model 5, we find that the incremental effect of $FTR5$ on outbound transfers (θ_{FTR5}) is 0.170 (p-value = 0.013) after we include the additional control variables on the return on sales parameters. Though the parameter estimate drops slightly, the statistical significance increases

slightly. Economically, the coefficient suggests that a one standard deviation increase in $FTR5$ results in an increase in outbound transfers of 0.035. In Model 5, we also find that the incremental effect of $FTR5$ on inbound transfers (γ_{FTR5}) is -0.441 (p-value < 0.001). Economically, the coefficient suggests that a one standard deviation decrease in $FTR5$ results in an increase in inbound transfers of 0.088. The result suggests that as the foreign rate increases above the domestic statutory tax rate, firms transfer more income to the U.S.

Overall, the results of these tests are consistent with those in prior studies documenting that outbound transfers increase with the tax incentive to shift income out of the U.S. and provide support for the validity of our new measure. We next proceed to tests of our hypothesis, which has not been examined in the literature to date.

6.3. Tests of Hypothesis – Financial constraints and outbound shifting

Our hypothesis predicts that firms facing financial constraints in the U.S. will shift less income out of the U.S. than their unconstrained peers. Ideally, we would test this hypothesis using a jurisdiction-specific measure of financial constraint. However, to our knowledge, no such measure has been developed using publicly available data. Moreover, our dataset is insufficiently rich to adapt existing measures of financial constraints to jurisdiction-specific measures. As such, we use worldwide financial constraint as our proxy for financial constraint in the U.S.[35] Since the measurement of financial constraints has been a contentious topic in the literature for many years and many different proxies have been introduced, we report results of our test of this hypothesis using three different proxies. Models 1 and 2 of Table 4 report results using $JUNK\ RATING$, Models 3 and 4 using $SA\ INDEX$ (Hadlock and Pierce 2010), and Models

[35] While it is possible that a firm could be severely financially constrained domestically and not financially constrained abroad (and, thus, be unconstrained on a net global basis), we assume that our global measures of financial constraints are positively correlated with domestic financial constraints.

5 and 6 using $NODIVIDENDS$.

The first proxy for financial constraints is $JUNK\ RATING$. This indicator equals one when the firm's debt is rated below BBB by Standard & Poor's. Recent research in finance suggests this is the most reliable proxy for financial constraints (Farre-Mensa and Ljungqvist, 2013). This specification has the fewest observations because we exclude all firm-years that do not have debt ratings in Compustat, as suggested by Farre-Mensa and Ljungqvist (2013). The test of our hypothesis is whether the incremental effect of $JUNK\ RATING$ on outbound transfers (captured by the coefficient $\theta_{JUNK\ RATING}$) is statistically different from zero. In this case, the predicted sign on the coefficient is negative. In Model 1 and Model 2 of Table 4, the estimate of $\theta_{JUNK\ RATING}$ is negative and strongly significant, consistent with the hypothesis. The estimate of -0.195 (p-value < 0.001) in Model 2 (which includes additional controls on the return on sales parameters, ρ_f and ρ_d) indicates that financially constrained firms transfer 19.5 percentage points less income out of the U.S. than non-constrained firms. We find that the effect of $JUNK\ RATING$ on inbound transfers is insignificant in both models. This is consistent with our arguments in Section 3.3 that a firm is indifferent between shifting income into the U.S. (and paying the U.S. tax bill) and not shifting income to the U.S., but instead paying a dividend to the U.S. parent (and paying the incremental U.S. tax less credit for foreign taxes paid).

We rely on the work of Hadlock and Pierce (2010) in selecting our second proxy for financial constraints. Hadlock and Pierce (2010) examine a number of proposed proxies for financial constraints, and conclude that a non-linear index based on the size and age of the firm is the best proxy for financial constraints. The results using this proxy are presented in Table 4, Models 3 and 4. The coefficient of interest ($\theta_{SA\ INDEX}$), is negative and statistically significant (p-values < 0.001) in both models, consistent with predictions.

Finally, a number of studies (e.g., Hadlock and Pierce 2010; Campello et al. 2010) assert that firms that do not pay dividends are financially constrained.[36] The intuition is that the firms lack available cash with which to pay dividends. Alternatively, one could imagine a scenario where a firm feels constrained by an implicit obligation to pay a dividend even when cash is tight to avoid reducing the payout ratio. Though these theories predict opposite results with regard to income shifting, we follow the majority of prior research and classify firms that pay no dividends as constrained. Results using $NODIVIDENDS$, are reported in Models 5 and 6 of Table 4. In Model 5, the coefficient $\theta_{NODIVIDENDS}$ is negative and marginally statistically significant (p-value = 0.057). In Model 6, where we include additional controls on the return on sales parameters, the estimate is negative (-0.085) and more reliably significant (p-value = 0.018), suggesting that non-constrained firms transfer 8.5% more domestic income to foreign jurisdictions than constrained firms.

As was noted previously, the correlations among the three financial constraints proxies shown in Panel B of Table 2 are not particularly high (31% between $SA\ INDEX$ and $NODIVIDENDS$, 25% between $JUNK\ RATING$ and $SA\ INDEX$ and 42% between $JUNK\ RATING$ and $NODIVIDENDS$). Given that we cannot be sure which of the three is best capturing financial constraints, it is reassuring that the results of the tests using all three yield similar conclusions with regard to our hypothesis.

6.4. Sensitivity to differences in firm characteristics

The correlations reported in Table 2 show that our three proxies for financial constraints are correlated with a variety of firm characteristics. Because our model is sufficiently flexible to

[36] Farre-Mensa and Ljungqvist (2013) argue that dividend payment is not a good proxy for financial constraints. However, as the debate is unsettled in the finance literature, we include tests using the proxy for completeness.

allow the income transfer parameters to vary as a function of a vector of variables, we conduct additional tests in which we allow the transfer parameters to vary with a number of characteristics of the firm. Results of these tests are reported in Table 5. Each of the three columns reports results using the proxy for financial constraints listed in the column heading. Because $SA\ INDEX$ is a linear function of size, we repeat the test of Model 2 but exclude the size control on the transfer parameters.

The estimates of the coefficients on $\theta_{CONSTRAINED}$ remain negative and significant in all three models, with magnitudes that are largely consistent with the corresponding models in Table 4. Taken as a whole, the results in Table 5 provide assurance that the main results in support of our hypothesis reported in Table 4 are not being driven by differences in firm characteristics.[37] Moreover, the results provide information that could be useful as researchers build on our study in the future.

6.5. Sensitivity to assumption that the basis of sales is customer location

As noted in Section 4.1, we reviewed the 10K filings of our sample firms and determined that 41% of them explicitly state that their segment sales are reported based on customer location. All of the tests in Tables 3, 4 and 5 are estimated using the sample of firm-years having all required data and assume that the basis of geographic segment reporting is the location of the customer (i.e., that sales are recorded as foreign when the customer is outside the U.S., and domestic when the customer is inside the U.S.). To determine if our results are sensitive to our

[37] One additional characteristic that we considered including is the tax haven variable used in Table 3. We did not include this variable because we view financial constraints and tax haven as essentially capturing the firm's tax motivation to shift income out of the U.S. In unreported results we do include *HAVEN* as a control variable, along with all other variables reported in Table 5, and our results remain qualitatively similar, though the economic magnitude of both the *HAVEN* and *CONSTRAINED* variables is smaller, suggesting they are both related to the firm's incentive to shift income for tax benefits.

assumption, we re-estimate the tests on the subsample of firm-years for which the basis of sales was explicitly stated to be the location of the customer. Results of these tests, which we leave untabulated, are consistent with those reported in Table 4, with the coefficients on the incremental effect of financial constraints loading negatively in each of the 3 models.

6.6. Additional tests

We conduct a number of additional tests to evaluate the sensitivity of our results to various research design choices. First, we re-estimate the model using a firm-fixed effects specification and levels of pretax earnings and sales variables instead of changes. Results using this specification are qualitatively similar to the results we report in the study. However, if we do not include firm fixed effects, parameter estimates become unstable and results vary substantially from model to model.

Second, we test our hypothesis using the Collins et al. (1998) model, adapted to our research question. We estimate:

$$\frac{PIFO}{SALEFO} = \omega_0 + \omega_1 \frac{PI}{SALE} + \omega_2 FTR5 + \omega_3 CONSTRAINED + \omega_4 FTR5 * CONSTRAINED + \sum_c \omega_c C + \epsilon. \quad (6)$$

where PI is consolidated worldwide pretax income, $SALE$ is consolidated worldwide sales, $CONSTRAINED$ is a proxy for financial constraint, and all other variables are as previously defined.

The model assumes that the rate of return on foreign sales, $\frac{PIFO}{SALEFO}$, is a linear function of worldwide return on sales, $\frac{PI}{SALE}$, which, by definition, is uncontaminated by income transfers. To the extent that the tax incentive variable ($FTR5$) has explanatory power incremental to the

worldwide return on sales, income shifting is inferred. Thus, a positive coefficient on $FTR5$ suggests income shifting in response to tax incentives, and a negative coefficient on the interaction of $FTR5$ and $CONSTRAINED$ suggests that income shifting is mitigated when firms are financially constrained. In untabulated tests, we find that the tax incentive variable is positive and statistically significant, and the interaction of the tax incentive variable and financial constraints is negative and statistically significant, consistent with our predictions and with results from our earlier tests. [38]

Third, our main tests use standard errors that are clustered by firm and time. However, Gow et al. (2010) suggest that when standard errors are clustered on a dimension with relatively few clusters (time in our study), they can be biased. We re-estimate our models but cluster standard errors only by firm, and find that our statistical conclusions are not altered.

Finally, we consider the possibility of endogeneity in our research design that could be affecting our results. One form of endogeneity, the correlated omitted variables problem, is a common concern in cross-sectional studies. These concerns are somewhat mitigated in our study by the fact that we are able to include firm-level controls on the transfer parameters (θ and γ) and the return on sales parameters (ρ_d and ρ_f) and by the fact that $\rho_{d\,JUNK\ RATING}$ and $\rho_{f\,JUNK\ RATING}$ are not statistically significant (Table 4, Models 1 and 2). Nonetheless, some research suggests that propensity score matching can reduce concerns that results are driven by correlated omitted variables (Armstrong et al. 2010). To this end, we estimate Models 1 and 2 of Table 4 using a

[38] It is not entirely clear how to adapt the Collins et al. (1998) model to our setting. Collins et al. (1998) use a piecewise non-linear approach to separate outbound and inbound income shifting. It is not clear how to separate inbound and outbound income shifting with our proxies for financial constraints. An alternative implementation of this model in our setting would be to remove the $FTR5 * CONSTRAINED$ interaction term and focus on the ω_2 coefficient. When we do this we find mixed results. In some specifications ω_2 is negative as expected. In other specifications it is positive. And in others it is insignificant.

sample of constrained and unconstrained firms matched using propensity scores and results (untabulated) are consistent with those in Table 4.

6.7. Estimates of amounts shifted and tax deferred

Our parameter estimates allow us to calculate dollar estimates of the amount of outbound and inbound income shifting. We first examine the outbound shifting by firms with tax incentives to shift income out of the U.S. that is incremental to the amount of outbound transfers observed in firms with no such incentive. In Model 3 of Table 3, we found that firms with tax haven operations shift 6.4% more of their income to foreign jurisdictions. If we assume that the estimated parameter applies linearly through all levels of a firm's income, this parameter implies that the mean (median) firm with tax haven operations shifts about $26 million ($6 million) of pre-transferred domestic income to foreign jurisdictions per year (above what would be expected absent tax incentives).[39] Aggregated over all firm-years with tax haven operations, we estimate a total of $163 billion in incremental outbound income shifting in our sample period. An upper bound estimate of tax deferral would be to assume that firms would have paid a 35% tax rate on these earnings, but instead paid nothing. This would result in deferral of $57 billion in tax.[40] During this same time period, these firms paid an aggregate of $456 billion in federal taxes. Thus, the estimated tax deferral is about 13% of federal taxes paid.

Putting these estimates in context relative to other estimates of income shifting is not straightforward since methods and samples differ substantially. Klassen and Laplante (2012b) estimate that the mean firm (all firms combined) in their subsample of 380 firms with a tax

[39] The mean firm-year with tax haven operations has $2,674 million in domestic sales. Using 15.1% as the value of ρ_d for firms with tax haven operations (estimated in the regressions), we calculate $26 million as $2,674*0.151*0.064, where 0.064 is the incremental outbound income shifting reported in Table 3.

[40] This is an upper bound on the estimate of the amount of tax deferred since not all income shifted out of the U.S. would be shifted to no-tax foreign countries.

incentive to shift income out of the U.S. shifted $26 million ($10,000 million) more per year in 2005-2009 than it (they) did in 1998-2002. The most direct comparison we can make between these estimates and ours is at the mean firm-year level: we estimate that the mean firm-year in our sample period (1998-2011) shifted $26 million out of the U.S for tax reasons, which is coincidentally exactly the same amount reported in Klassen and Laplante (2012b). However, their $26 million is an estimate of shifting that is *incremental* to what was being shifted in the earlier period, while ours is an average amount over the entire sample period. Thus, it is likely that our estimates are substantially lower than the Klassen and Laplante (2012b) estimates.

Another estimate of shifting that is often cited is that of Clausing (2009). Using country-level data on the activities of U.S. multinationals, she estimates that, in 2002, $87 billion of domestic income was shifted out of the U.S. in response to tax incentives. This estimate is more than five times larger than our estimate of $10.9 billion per year ($163 billion/15 years). However, when one considers that we are using an average of 648 firms per year and Clausing (2009) is, in principle, capturing the shifting of every U.S. entity that is required to report to the Bureau of Economic Analysis, the estimates may not be as inconsistent as they first appear.[41] That said, we view our estimates less as validation checks or critiques of those in prior literature and more as additional data points to aid in the estimation of an unobservable number.

Finally, we estimate the magnitude of the effect of financial constraints on outbound income shifting. As we noted earlier, recent research suggests that the existence of a junk bond rating is the most reliable measure of financial constraints. We find that financially constrained firms shift 19.5% less of their domestic income to foreign jurisdictions when using $JUNK\ RATING$ as the proxy for financial constraints. This translates to a mean (median)

[41] 648 = 9,727 firm-years/15 years (see Table 1).

estimate of the amount not shifted due to financial constraints of $69 million ($31 million) per firm-year in the sub-sample of observations that have bond ratings.

6.8. Policy implications

Our finding that financially unconstrained firms shift earnings out of the U.S. at a higher rate than constrained firms has important policy implications. Holding all other characteristics of tax regimes constant, the primary factor preventing the current U.S. worldwide tax system from being a de facto territorial tax system is an inability to take advantage of the deferral provision. That is, a firm operating under a worldwide system that is able to infinitely defer repatriation of its foreign earnings is, in substance, operating under a territorial system.[42] We assert that financial constraint is an appropriate proxy for the inability to defer repatriation since, all else equal, a financially constrained firm cannot look to sources outside the firm to satisfy its liquidity needs. We posit that financially unconstrained firms are behaving as if deferral is infinite and would, therefore, engage in outbound shifting at rates similar to firms operating in a territorial tax system. That is, we can apply the rate of income shifting estimated for unconstrained firms relative to constrained firms to approximate the incremental income shifting effects that would have been observed had the U.S. employed a territorial tax system during our sample period, ceteris paribus.[43]

[42] This assertion relies on the assumption that the underlying foreign earnings are eligible for deferral. As discussed previously, the deferral of U.S. tax on foreign earnings is denied under Subpart F if the earnings are passive in nature.

[43] Most costs of income shifting are likely common to territorial and worldwide tax systems. There is, however, at least one major cost borne by firms under a worldwide system with deferral that is not present in a territorial system: the cost of having cash trapped in foreign jurisdictions.

The results suggest that constrained firms would have shifted approximately $80 billion more out of the U.S over our sample period.[44] This represents an increase in total dollars shifted out of the U.S. of 8% during our sample period if the adoption of a territorial system would have caused constrained firms to shift like unconstrained firms. This estimate should be interpreted with caution, however, because it ignores unanticipated behavioral responses by firms and actions taken by governments that would certainly arise with a change in the tax system. Any material changes in firm or government behavior would invalidate our assumption that all else is held constant and impair the accuracy of the estimate.

If our estimates are reliable, the increase in shifted income under a territorial tax system would result in a decrease in tax revenues. However, it is reasonable to assume that this decrease in tax revenues would be partially offset by economic gains achieved through at least four different channels. The first is that firms would no longer incur the costs necessary to obtain third-party financing to address liquidity needs in the U.S. The second is that investment distortions that occur when cash is trapped would be reduced (see Hanlon et al. 2015, and Edwards et al. 2015, for example). Third, it is possible that new base erosion provisions would be enacted as part of a tax reform agenda were the U.S. to adopt a territorial system, which would also help limit the decrease in tax revenues, and could potentially increase tax revenues if those provisions were to reduce the income shifting ability of financially unconstrained firms. Finally, Grubert and Altshuler (2013) show that U.S. tax revenues on foreign income would actually increase if the U.S. adopted a dividend exemption system. Whether any of these effects

[44] This number is calculated as follows. First, the aggregate domestic sales for financially constrained firms in our sample is $2,792,847 million (using the junk rating proxy for financial constraints). We multiply this number by (0.159-0.012)=0.147, the rate of return on domestic sales for constrained firms, which gives $410,549 million in estimated pre-shifted domestic earnings. Then, multiplying this number by 0.195, the incremental outbound shifting estimated in Table 4, Model 2, we arrive at $79,957 million, or $80 billion.

would be sufficient to overcome the lost tax revenues from increased income shifting using our static estimates is an empirical question that is beyond the scope of our study.

7. Conclusion

In this study, we show that firms facing financial constraints shift less income out of the U.S. into foreign jurisdictions than do their unconstrained peers. We develop a new technique to measure income shifting that is more direct and requires fewer restrictive assumptions than the methods in the extant literature. We validate the measure by showing that, when it is used to estimate income shifting, firms with tax incentives to do so shift more income out of the U.S. We test the hypothesis that the need for external financing is a binding impediment to outbound income transfers for firms that face financial constraints. Our estimates suggest that financially constrained firms shift substantially less of their domestic income to foreign locations than their unconstrained peers. Assuming that the inability to defer repatriation is the primary factor preventing the U.S. worldwide tax system from being a de facto territorial system, we use our findings to estimate that adopting a territorial tax system would increase outbound income shifting by about 8%.

While our new measure requires fewer assumptions and allows us to examine cross-sectional differences in income shifting more directly, our ability to draw inferences is limited, as in all such studies, by the validity of the empirical proxies used. In particular, the measures of financial constraint we adopt from extant literature are the subject of ongoing controversy. To the extent that these measures capture the high cost of domestic external financing for a firm, our results provide evidence that will be of interest to researchers and policymakers alike.

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Appendix

As described in the text, the models we estimate are:

$$\Delta PIFO = \alpha_0 + (1-\gamma)\rho_f \Delta SALEFO^* + \theta\rho_d \Delta SALEDOM^* + \epsilon, \quad (4a)$$

$$\Delta PIDOM = \beta_0 + \gamma\rho_f \Delta SALEFO^* + (1-\theta)\rho_d \Delta SALEDOM^* + u.^{45} \quad (4b)$$

The parameters in the model can be expressed as functions of other variables that might be expected to affect the parameters:

$$\theta = \theta_0 + \theta_1 X, \quad (5a)$$

$$\gamma = \gamma_0 + \gamma_1 X, \quad (5b)$$

$$\rho_d = \rho_{d_0} + \rho_{d_1} X + \textstyle\sum_c \rho_{d_c} X_c, \quad (5c)$$

$$\rho_f = \rho_{f_0} + \rho_{f_1} X + \textstyle\sum_c \rho_{f_c} X_c, \quad (5d)$$

As noted by Khan and Watts (2009), who use a similar technique to examine cross sectional variation in conservatism parameters, the expressions in Eq. 5a, 5b, 5c, and 5d are not regression equations, but can be can be substituted into Eq. 4a and 4b to give:

$$\begin{aligned}\Delta PIFO = {} & \alpha_0 + (1 - [\gamma_0 + \gamma_1 X])[\rho_{f_0} + \rho_{f_1} X + \\ & \textstyle\sum_c \rho_{f_c} X_c]\Delta SALEFO^* + [\theta_0 + \theta_1 X][\rho_{d_0} + \rho_{d_1} X + \\ & \textstyle\sum_c \rho_{d_c} X_c]\Delta SALEDOM^* + \epsilon, \end{aligned} \quad (6a)$$

$$\begin{aligned}\Delta PIDOM = {} & \beta_0 + [\gamma_0 + \gamma_1 X][\rho_{f_0} + \rho_{f_1} X + \textstyle\sum_c \rho_{f_c} X_c]\Delta SALEFO^* + \\ & (1 - [\theta_0 + \theta_1 X])[\rho_{d_0} + \rho_{d_1} X + \textstyle\sum_c \rho_{d_c} X_c]\Delta SALEDOM^* + u. \end{aligned} \quad (6b)$$

Eq. 6a and 6b can be estimated in standard statistical software packages quite easily. For example, the SAS code is:

```
proc model
```

[45] Because Eq. (4a) and (4b) contain exactly the same independent variables, OLS regressions are equivalent to seemingly unrelated regressions. We use seemingly unrelated regressions in the empirical tests because this allows us to separate the shifting parameters and the return on sales parameters, with associated test statistics in a single stage estimation. The models can be estimated using the *nlsur* command in STATA or the *proc model* command in SAS.

```
   dPIFO = a0 + (1-(gamma0+gamma1*X))*(rhof0+rhof1*X)*dSALEFO
              + (theta0+theta1*X)*(rhod0+rhod1*X)*dSALEDOM;
   dPIDOM = b0 + ((gamma0+gamma1*X))*(rhof0+rhof1*X)*dSALEFO
               + (1-(theta0+theta1*X))*(rhod0+rhod1*X)*dSALEDOM;
   fit  dPIFO dPIDOM/ sur;
run;
```

The STATA code is:

```
#delimit;
nlsur (dpifo = {a0} + (1-({gamma0}+{gamma1}*x))*({rhof0}+{rhof1}*x)*dsalefo
             + ({theta0}+{theta1}*x)*({rhod0}+{rhod1}*x)*dsaledom)
      (dpidom = {b0} + ({gamma0}+{gamma1 }*x)*({rhof0}+{rhof1}*x)*dsalefo
              + (1-({theta0}+{theta1}*x))*({rhod0}+{rhod1}*x)*dsaledom);
```

Alternatively, one could rewrite the models as follows, and estimate the equations using OLS.

$$\Delta PIFO = \alpha_0 + \alpha_1 \Delta SALEFO^* + \alpha_2 (X * \Delta SALEFO^*) + \alpha_3 (X^2 * \Delta SALEFO^*) + \alpha_4 \Delta SALEDOM^* + \alpha_5 (X * \Delta SALEDOM^*) + \alpha_6 (X^2 * \Delta SALEDOM^*) + \epsilon, \quad (7a)$$

$$\Delta PIDOM = \beta_0 + \beta_1 \Delta SALEFO^* + \beta_2 (X * \Delta SALEFO^*) + \beta_3 (X^2 * \Delta SALEFO^*) + \beta_4 \Delta SALEDOM^* + \beta_5 (X * \Delta SALEDOM^*) + \beta_6 (X^2 * \Delta SALEDOM^*) + u, \quad (7b)$$

where the coefficients estimates in Eq. 7a and 7b are:

$$\alpha_1 = \rho_{f_0}(1 - \gamma_0), \quad (8a)$$

$$\alpha_2 = \rho_{f_1} - \rho_{f_1}\gamma_0 - \rho_{f_0}\gamma_1, \quad (8b)$$

$$\alpha_3 = -\rho_{f_1}\gamma_1, \quad (8c)$$

$$\alpha_4 = \rho_{d_0}\theta_0, \quad (8d)$$

$$\alpha_5 = \rho_{d_1}\theta_0 + \rho_{d_0}\theta_1, \quad (8e)$$

$$\alpha_6 = \theta_1\rho_{d_1}, \quad (8f)$$

$$\beta_1 = \rho_{f_0}\gamma_0, \tag{8g}$$

$$\beta_2 = \rho_{f_1}\gamma_0 + \rho_{f_0}\gamma_1, \tag{8h}$$

$$\beta_3 = \rho_{f_1}\gamma_1, \tag{8i}$$

$$\beta_4 = \rho_{d_0}(1 - \theta_0), \tag{8j}$$

$$\beta_5 = \rho_{d_1} - \rho_{d_1}\theta_0 - \rho_{d_0}\theta_1, \tag{8k}$$

$$\beta_6 = -\rho_{d_1}\theta_1. \tag{8l}$$

One can then solve for each of the parameters of interest in terms of the estimated coefficients. For example, $\theta_0 = \frac{\alpha_4}{\alpha_4+\beta_4}$, and $\theta_1 = \frac{\alpha_5(\alpha_4+\beta_4)+\alpha_4(\alpha_4+\beta_5)}{(\alpha_4+\beta_4)^2}$. However, to generate standard errors for non-linear combinations of coefficients after OLS estimation in order to test the hypotheses in our study, a post-estimation command, such as nlcom in STATA, is necessary.

Table 1 – Sample Selection.

Criteria	Firms	Firm-years
Multinational firms with data beginning in 1998 with foreign and domestic sales summing to within 1% of total sales and foreign an domestic pretax income summing to within 1% of total pretax income.	2,627	12,801
Drop regulated firms (SIC 4900-4999, SIC 6000-6999)	2,526	12,438
Drop firms organized as flow-through entities	2,486	12,258
Drop firms incorporated in foreign countries	2,217	11,218
Drop firms missing a CIK number to link to SEC filings for tax haven data, and firms with missing tax haven data	2,149	10,739
Drop firms with Special Items greater than 10% of Sales, and Interest Income greater than 10% of Sales, and firms with total assets in the current or previous year less than $1 million.	2,058	9,727

Financial statement data are obtained from Compustat. Domestic and foreign sales are obtained from geographic segment disclosures, while domestic and foreign pretax income are obtained from the income tax footnote. Data for coding the tax haven variable are obtained from Exhibit 21 of the firm's 10K filed with the SEC.

Table 2 – Summary statistics.

Panel A: Univariate summary statistics.

NAME	N	MEAN	STD	P25	P50	P75
ΔPIFO	9,727	0.007	0.036	-0.005	0.003	0.016
ΔPIDOM	9,727	0.015	0.089	-0.019	0.007	0.039
ΔSALEFO	9,727	0.044	0.115	-0.001	0.028	0.078
ΔSALEDOM	9,727	0.036	0.152	-0.021	0.026	0.091
JUNK RATING	3,629	0.460	0.499	0.000	0.000	1.000
SA INDEX	9,570	0.333	0.471	0.000	0.000	1.000
NODIVIDENDS	7,484	0.535	0.499	0.000	1.000	1.000
HAVEN	9,727	0.645	0.479	0.000	1.000	1.000
FTR5	5,801	0.018	0.200	-0.055	0.044	0.132
WW RETURN ON SALES	9,727	0.061	0.124	0.010	0.064	0.125
R&D EXPENSE	9,727	0.061	0.082	0.000	0.021	0.096
ADVERTISING EXPENSE	9,727	0.010	0.025	0.000	0.000	0.007
FOREIGN TO TOTAL SALES	9,727	0.386	0.223	0.202	0.367	0.538
CASH TO ASSETS	9,727	0.184	0.178	0.040	0.121	0.280
DEBT TO ASSETS	9,727	0.205	0.207	0.016	0.166	0.312
LOG ASSETS	9,727	6.592	1.826	5.312	6.590	7.831
INTANGIBLE TO TOTAL ASSETS	9,727	0.181	0.173	0.034	0.132	0.285

This table reports descriptive statistics for the sample used in the cross-sectional tests. N reports the number of firm-years in the sample period 1998-2011. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $CONSTRAINED\ (JUNK\ RATING)$ is an indicator variable = 1 if firm *i* has below investment grade S&P bond rating in year *t*; 0 otherwise. $CONSTRAINED\ (SA\ INDEX)$ is an indicator variable = 1 if firm *i* has an *SA INDEX* value in the upper third of the sample in year *t*; 0 otherwise. *SA INDEX* is a measure of financial constraints based on firm size and firm age, developed by Hadlock and Pierce (2010). $CONSTRAINED\ (DIVIDENDS)$ is an indicator variable = 1 if firm *i* does not pay dividends in year *t*. $HAVEN$ is an indicator variable = 1 if firm *i* reports having significant operations in at least one tax haven country in year *t*; 0 otherwise. $FTR5$ is 35% less the 5-year foreign effective tax rate for the firm, calculated as $0.35 - \frac{\sum_5 TXFO}{\sum_5 PIFO}$. $WW\ RETURN\ \ ON\ SALES$ is $Consolidated\ pretax\ income/Consolidated\ sales$. $FOREIGN\ TO\ TOTAL\ SALES$ is $Foreign\ sales/(Foreign\ sales + Domestic\ sales)$. $CASH\ TO\ ASSETS$ is $Cash/Total\ assets$. $DEBT\ TO\ ASSETS$ is $Long\text{-}term\ debt/Total\ assets$. $LOG\ ASSETS$ is $\log(Total\ assets)$. $INTANGIBLE\ TO\ TOTAL\ ASSETS$ is $Intangible\ assets/Total\ assets$.

Table 2 – Summary statistics (continued).

Panel B: Pearson (Spearman) correlations above (below) the diagonal.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 *ΔPIFO*		0.15*	0.30*	0.10*	-0.01	0.03*	0.08*	0.04*	0.03*	0.18*	0.02*	-0.00	0.12*	0.08*	-0.04*	-0.01	-0.04*
2 *ΔPIDOM*	0.16*		0.11*	0.20*	0.07*	0.07*	0.12*	0.00	-0.04*	0.14*	0.06*	-0.02	-0.01	0.11*	-0.04*	-0.08*	-0.04*
3 *ΔSALEFO*	0.36*	0.16*		0.25*	-0.03	0.01	0.08*	0.06*	0.04*	0.19*	-0.04*	-0.04*	0.24*	0.03*	-0.07*	0.03*	-0.03*
4 *ΔSALEDOM*	0.17*	0.30*	0.33*		-0.00	0.02*	0.09*	-0.01	0.02	0.20*	-0.08*	-0.01	-0.18*	-0.02	-0.04*	0.03*	0.04*
5 *JUNK RATING*	-0.05*	0.05*	-0.06*	-0.01		0.25*	0.42*	-0.10*	-0.09*	-0.38*	-0.06*	-0.07*	-0.09*	0.00	0.41*	-0.54*	0.07*
6 *SA INDEX*	-0.01	0.05*	0.00	0.04*	0.25*		0.31*	-0.28*	-0.03*	-0.25*	0.26*	-0.03*	-0.02	0.29*	-0.16*	-0.59*	-0.13*
7 *NODIVIDENDS*	0.05*	0.12*	0.07*	0.10*	0.42*	0.31*		-0.06*	0.01	-0.04*	0.31*	-0.06*	0.07*	0.31*	-0.15*	-0.34*	-0.04*
8 *HAVEN*	0.07*	0.00	0.08*	-0.02*	-0.10*	-0.28*	-0.06*		0.06*	0.16*	0.02	0.05*	0.24*	-0.01	-0.02	0.38*	0.11*
9 *FTR5*	0.07*	-0.02	0.07*	0.02	-0.09*	-0.03*	0.06*	0.09*		0.15*	0.10*	0.01	0.10*	0.14*	-0.06*	0.09*	0.01
10 *WW RETURN ON SALES*	0.23*	0.23*	0.22*	0.24*	-0.41*	-0.23*	-0.06*	0.16*	0.18*		-0.19*	0.05*	0.05*	0.03*	-0.15*	0.36*	0.08*
11 *R&D EXPENSE*	0.02*	0.04*	0.03*	-0.08*	-0.16*	0.21*	0.25*	0.05*	0.13*	-0.00		-0.05*	0.29*	0.61*	-0.31*	-0.22*	-0.04*
12 *ADVERTISING EXPENSE*	-0.01	0.00	-0.04*	-0.01	-0.03	0.02*	0.02	0.04*	0.01	0.04*	0.06*		-0.06*	0.01	0.07*	0.12*	0.10*
13 *FOREIGN TO TOTAL SALES*	0.14*	-0.04*	0.28*	-0.21*	-0.10*	-0.03*	0.06*	0.25*	0.13*	0.07*	0.35*	-0.08*		0.22*	-0.14*	0.07*	-0.08*
14 *CASH TO ASSETS*	0.08*	0.11*	0.06*	-0.02*	-0.03*	0.25*	0.29*	0.04*	0.16*	0.11*	0.52*	0.13*	0.25*		-0.47*	-0.25*	-0.28*
15 *DEBT TO ASSETS*	-0.06*	-0.07*	-0.08*	-0.05*	0.40*	-0.23*	-0.22*	0.03*	-0.09*	-0.14*	-0.36*	-0.06*	-0.13*	-0.61*		0.18*	0.19*
16 *LOG ASSETS*	0.05*	-0.05*	0.04*	0.01	-0.54*	-0.60*	-0.34*	0.38*	0.13*	0.33*	-0.20*	0.04*	0.09*	-0.24*	0.30*		0.24*
17 *INTANGIBLE TO TOTAL ASSETS*	-0.01	-0.04*	-0.00	0.06*	0.05*	-0.17*	-0.06*	0.13*	0.02	0.10*	-0.03*	0.09*	-0.06*	-0.24*	0.22*	0.28*	

This table reports correlations for the sample used in the cross-sectional tests. Pearson coefficients are reported above the diagonal, Spearman coefficients below the diagonal. $\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*. $CONSTRAINED$ ($JUNK\ RATING$) is an indicator variable = 1 if firm *i* has below investment grade S&P bond rating in year *t*; 0 otherwise. $CONSTRAINED$ ($SA\ INDEX$) is an indicator variable = 1 if firm *i* has an *SA INDEX* value in the upper third of the sample in year *t*; 0 otherwise. *SA INDEX* is a measure of financial constraints based on firm size and firm age, developed by Hadlock and Pierce (2010). $CONSTRAINED$ ($NODIVIDENDS$) is an indicator variable = 1 if firm *i* does not pay dividends in year *t*. $HAVEN$ is an indicator variable = 1 if firm *i* reports having significant operations in at least one tax haven country in year *t*; 0 otherwise. $FTR5$ is 35% less the 5-year foreign effective tax rate for the firm, calculated as $0.35 - \frac{\sum_5 TXFO}{\sum_5 PIFO}$. $WW\ RETURN\ ON\ SALES$ is $Consolidated\ pretax\ income/Consolidated\ sales$. $FOREIGN\ TO\ TOTAL\ SALES$ is $Foreign\ sales/(Foreign\ sales + Domestic\ sales)$. $CASH\ TO\ ASSETS$ is $Cash/Total\ assets$. $DEBT\ TO\ ASSETS$ is $Long-term\ debt/Total\ assets$. $LOG\ ASSETS$ is $\log(Total\ assets)$. $INTANGIBLE\ TO\ TOTAL\ ASSETS$ is $Intangible\ assets/Total\ assets$.

* indicates statistical significance at the 5% level.

Table 3 –Outbound Transfers and Tax Incentives

	Model 1	Model 2	Model 3	Model 4	Model 5
Outbound Transfers					
θ_0	0.079***	0.025	0.066**	0.141***	0.117***
	(3.06)	(0.68)	(2.02)	(3.87)	(4.23)
θ_{HAVEN}		0.113***	0.064**		
		(3.61)	(1.96)		
θ_{FTR5}				0.233**	0.170**
				(1.82)	(2.22)
Inbound Transfers					
γ_0	0.412***	0.365***	0.469***	0.405***	0.426***
	(6.65)	(5.74)	(12.10)	(8.75)	(7.36)
γ_{HAVEN}		-0.018	-0.058*		
		(-0.26)	(-1.56)		
γ_{FTR5}				-0.223	-0.441***
				(-1.01)	(-3.72)
Return on Domestic Sales					
ρd_o	0.079***	0.117***	0.164***	0.123***	0.177***
	(2.96)	(5.71)	(9.80)	(7.59)	(11.35)
ρd_{HAVEN}		-0.006	-0.013		
		(-0.34)	(-1.26)		
ρd_{FTR5}				0.003	-0.042
				(0.05)	(-1.57)
Return on Foreign Sales					
ρf_o	0.145***	0.149***	0.181***	0.169***	0.186***
	(11.07)	(7.37)	(12.47)	(8.73)	(9.85)
ρf_{HAVEN}		-0.031	-0.066***		
		(-1.55)	(-5.98)		
ρf_{FTR5}				0.125	-0.092**
				(1.55)	(-2.23)
Additional Controls on ρd and ρf	NO	NO	YES	NO	YES
Intercept (*dPIDOM* equation)	0.006	0.007*	0.001	0.002	-0.001
	(-0.42)	(1.74)	(0.37)	(0.50)	(-0.31)
Intercept (*dPIFO* equation)	0.002	0.002	0.001	0.000	-0.001
	(-0.11)	(0.13)	(1.55)	(0.01)	(-0.67)
ADJRSQ (*dPIDOM* equation)	0.045	0.050	0.097	0.077	0.124
ADJRSQ (*dPIFO* equation)	0.089	0.080	0.113	0.159	0.234
N	9,385	9,402	9,051	5,598	5,594

$$\Delta PIFO = \alpha_0 + (1-\gamma)\rho_f \Delta SALEFO^* + \theta\rho_d \Delta SALEDOM^* + \epsilon \quad (4a)$$

$$\Delta PIDOM = \beta_0 + \gamma\rho_f \Delta SALEFO^* + (1-\theta)\rho_d \Delta SALEDOM^* + u \quad (4b)$$

$\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*.

Table 3 –Outbound Transfers and Tax Incentives (continued)

In Models 2-5, $\theta = \theta_0 + \theta_{HAVEN} HAVEN$ (or $\theta_{FTR5} FTR5$), $\gamma = \gamma_0 + \gamma_{HAVEN} HAVEN$ (or $\gamma_{FTR5} FTR5$), $\rho f = \rho f_0 + \sum_c \rho f_c C$, and $\rho d = \rho d_0 + \sum_c \rho d_c C$, where *C* is a vector of control variables. In Models 3 and 5, the vector *C* contains $WW\ RETURN\ ON\ SALES$, $R\&D\ EXPENSE$, $ADVERTISING\ EXPENSE$, $FOREIGN\ TO\ TOTAL\ SALES$, $CASH\ TO\ ASSETS$, $DEBT\ TO\ ASSETS$, $INTANGIBLE\ TO\ TOTAL\ ASSETS$, and $LOG\ ASSETS$ which are not presented in the table, in addition to $HAVEN$ or $FTR5$, which are presented.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.
Standard errors are clustered by firm and by year.
t-statistics are reported in parentheses under each estimate.

Table 4 –Outbound Transfers and Financial Constraints

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Outbound Transfers						
θ_0	0.197***	0.260***	0.130***	0.123***	0.085**	0.090***
	(3.77)	(7.45)	(4.85)	(6.88)	(2.20)	(2.86)
$\theta_{JUNK\ RATING}$	-0.269***	-0.195***				
	(-2.66)	(-3.49)				
$\theta_{SA\ INDEX}$			-0.095***	-0.091***		
			(-3.36)	(-3.47)		
$\theta_{NODIVIDEND}$					-0.065*	-0.085**
					(-1.58)	(-2.09)
Inbound Transfers						
γ_0	0.368***	0.381***	0.328***	0.414***	0.116	0.330***
	(3.62)	(3.94)	(4.04)	(5.74)	(0.93)	(6.26)
$\gamma_{JUNK\ RATING}$	-0.104	-0.138				
	(-0.87)	(-1.63)				
$\gamma_{SA\ INDEX}$			0.069	0.078*		
			(0.77)	(1.92)		
$\gamma_{NODIVIDEND}$					0.278**	0.057
					(2.20)	(0.96)
Return on Domestic Sales						
ρd_o	0.091***	0.159***	0.105***	0.172***	0.106***	0.174***
	(5.89)	(7.91)	(6.21)	(8.99)	(11.17)	(12.74)
$\rho d_{JUNK\ RATING}$	-0.027	-0.012				
	(-1.08)	(-0.54)				
$\rho d_{SA\ INDEX}$			0.034***	-0.032**		
			(2.72)	(-2.55)		
$\rho d_{NODIVIDEND}$					0.018	0.041***
					(1.49)	(2.59)
Return on Foreign Sales						
ρf_o	0.127***	0.115***	0.115***	0.127***	0.091***	0.135***
	(4.58)	(5.89)	(4.69)	(6.22)	(4.29)	(8.54)
$\rho f_{JUNK\ RATING}$	-0.002	0.014				
	(-0.05)	(0.54)				
$\rho f_{SA\ INDEX}$			0.034	0.059**		
			(1.37)	(2.25)		
$\rho f_{NODIVIDEND}$					0.084***	-0.019
					(4.33)	(-1.52)
Additional Controls on ρd and ρf	NO	YES	NO	YES	NO	YES
Intercept (*dPIDOM* equation)	0.003	0.001	0.007*	0.003	0.008***	0.005*
	(1.02)	(0.28)	(1.67)	(0.69)	(3.26)	(1.79)
Intercept (*dPIFO* equation)	0.002	0.001	0.002	0.001	0.003	0.002***
	(0.07)	(0.53)	(0.20)	(1.42)	(0.26)	(2.78)
ADJRSQ (*dPIDOM* equation)	0.040	0.068	0.055	0.094	0.089	0.158
ADJRSQ (*dPIFO* equation)	0.098	0.174	0.081	0.109	0.127	0.184
N	3,506	3,505	9,245	9,237	7,232	7,236

Table 4 –Outbound Transfers and Financial Constraints

$$\Delta PIFO = \alpha_0 + (1-\gamma)\rho_f \Delta SALEFO^* + \theta\rho_d \Delta SALEDOM^* + \epsilon \quad (4a)$$

$$\Delta PIDOM = \beta_0 + \gamma\rho_f \Delta SALEFO^* + (1-\theta)\rho_d \Delta SALEDOM^* + u \quad (4b)$$

$\Delta PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*.

In Models 1-6, $\theta = \theta_0 + \theta_{JUNK\ RATING} JUNK\ RATING$ (or $\theta_{SA\ INDEX} SA\ INDEX$ or $\theta_{NODIVIDENDS} NODIVIDENDS$), $\gamma = \gamma_0 + \gamma_{JUNK\ RATING} JUNK\ RATING$ (or $\gamma_{SA\ INDEX} SA\ INDEX$ or $\gamma_{NODIVIDENDS} NODIVIDENDS$), $\rho f = \rho f_0 + \sum_c \rho f_c C$, and $\rho d = \rho d_0 + \sum_c \rho d_c C$, where *C* is a vector of control variables. In Models 2, 4, and 6, the vector *C* contains $WW\ RETURN\ ON\ SALES$, $R\&D\ EXPENSE$, $ADVERTISING\ EXPENSE$, $FOREIGN\ TO\ TOTAL\ SALES$, $CASH\ TO\ ASSETS$, $DEBT\ TO\ ASSETS$, $INTANGIBLE\ TO\ TOTAL\ ASSETS$, and $LOG\ ASSETS$ which are not presented in the table, in addition to $JUNK\ RATING$ or $SA\ INDEX$ or $NODIVIDENDS$, which are presented.

As shown in the appendix, the substitutions required to estimate the equations result in models with a number of interactive terms. To facilitate interpretation of the coefficients, all variables except indicator variables are mean-centered so that the coefficients can be interpreted as the effect of the variable on the hypothetical mean firm.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.
Standard errors are clustered by firm and by year.
t-statistics are reported in parentheses under each estimate.

Table 5 – Outbound Transfers and Financial Constraints – Sensitivity Analysis

	JUNK RATING	*SA INDEX*	*NO DIVIDEND*
Outbound Transfers			
θ_0	0.223***	0.146***	0.146***
	(4.88)	(4.52)	(4.96)
$\theta_{CONSTRAINED}$	-0.189***	-0.084***	-0.060**
	(-3.35)	(-3.21)	(-1.77)
θ_{WWROS}	-0.001	-0.017	0.072
	(-0.00)	(-0.15)	(0.31)
$\theta_{R\&D}$	0.997*	-0.249	-0.047
	(1.66)	(-1.05)	(-0.14)
$\theta_{ADVERTISING}$	-1.855	-0.672	-1.831***
	(-1.11)	(-1.35)	(-2.85)
θ_{FRATIO}	0.242	0.194	0.359***
	(0.89)	(1.49)	(2.99)
θ_{CASH}	-0.126	-0.038	0.006
	(-0.48)	(-0.27)	(0.04)
$\theta_{LEVERAGE}$	-0.106	0.021	0.037
	(-0.82)	(0.21)	(0.59)
θ_{SIZE}	-0.002		0.012
	(-0.06)		(0.85)
$\theta_{INTANGIBLES}$	0.094	0.012	0.037
	(0.48)	(0.11)	(0.29)
Inbound Transfers			
γ_0	0.235**	0.302***	0.329***
	(2.35)	(2.93)	(4.51)
$\gamma_{CONSTRAINED}$	-0.045	0.025	-0.052
	(-0.44)	(0.48)	(-0.85)
γ_{WWROS}	-0.714	-0.733***	-0.126
	(-1.36)	(-3.02)	(-0.45)
$\gamma_{R\&D}$	3.373***	1.713***	2.648***
	(4.67)	(5.42)	(7.57)
$\gamma_{ADVERTISING}$	-0.031	-1.292	-0.562
	(-0.01)	(-1.23)	(-0.61)
γ_{FRATIO}	-0.357**	-0.042	-0.351***
	(-2.23)	(-0.33)	(-3.52)
γ_{CASH}	-0.540*	-0.134	0.102
	(-1.69)	(-0.85)	(0.97)
$\gamma_{LEVERAGE}$	-0.572**	-0.546**	-0.393***
	(-2.26)	(-2.05)	(-2.63)
γ_{SIZE}	-0.000		-0.030
	(-0.01)		(-1.23)
$\gamma_{INTANGIBLES}$	-0.505	-0.754***	-0.427**
	(-1.18)	(-2.70)	(-2.54)

Table 5 (continued) – Outbound Transfers and Financial Constraints – Sensitivity Analysis

	JUNK RATING	*SA INDEX*	*NO DIVIDEND*
Return on Domestic Sales			
ρd_o	0.159***	0.166***	0.179***
	(10.82)	(7.93)	(15.01)
$\rho d_{CONSTRAINED}$	-0.021	0.016	-0.020*
	(-0.77)	(0.95)	(-1.79)
ρd_{WWROS}	0.765***	0.662***	1.128***
	(2.94)	(6.14)	(8.77)
$\rho d_{R\&D}$	1.066**	1.232***	0.880***
	(2.39)	(5.91)	(5.07)
$\rho d_{ADVERTISING}$	-0.648**	0.522	-0.747***
	(-2.52)	(1.55)	(-3.70)
ρd_{FRATIO}	0.108	0.045	0.023
	(1.54)	(1.05)	(0.65)
ρd_{CASH}	0.023	0.042	0.003
	(0.23)	(0.70)	(0.04)
$\rho d_{LEVERAGE}$	-0.123*	0.003	0.024
	(-1.90)	(0.06)	(0.72)
ρd_{SIZE}	-0.012		-0.017***
	(-1.31)		(-4.61)
$\rho d_{INTANGIBLES}$	0.046	-0.103**	-0.034
	(0.92)	(-2.03)	(-0.73)
Return on Foreign Sales			
ρf_o	0.097***	0.117***	0.141***
	(6.16)	(8.09)	(11.67)
$\rho f_{CONSTRAINED}$	0.041**	0.040***	0.023**
	(2.40)	(3.11)	(2.15)
ρf_{WWROS}	0.717***	0.516***	1.013***
	(5.26)	(4.42)	(11.08)
$\rho f_{R\&D}$	1.186***	0.463**	0.478***
	(5.01)	(2.46)	(2.71)
$\rho f_{ADVERTISING}$	0.332	0.078	0.105
	(0.75)	(0.27)	(0.45)
ρf_{FRATIO}	0.075***	0.097***	0.039**
	(2.99)	(2.73)	(2.45)
ρf_{CASH}	0.127	0.249***	0.244***
	(1.24)	(5.21)	(6.11)
$\rho f_{LEVERAGE}$	-0.004	0.032	0.023
	(-0.08)	(0.61)	(0.97)
ρf_{SIZE}	-0.004		-0.006
	(-0.47)		(-1.62)
$\rho f_{INTANGIBLES}$	-0.082	-0.065	-0.022
	(-1.09)	(-1.30)	(-0.77)
Intercept (*dPIDOM* equation)	0.002	0.004	0.005**
	(0.52)	(0.93)	(2.00)
Intercept (*dPIFO* equation)	0.001	0.001	0.002***
	(0.63)	(1.39)	(2.80)
ADJRSQ (*dPIDOM* equation)	0.071	0.091	0.158
ADJRSQ (*dPIFO* equation)	0.169	0.117	0.187
N	3,507	9,248	7,240

Table 5 (continued) – Outbound Transfers and Financial Constraints – Sensitivity Analysis

$$\Delta PIFO = \alpha_0 + (1-\gamma)\rho_f \Delta SALEFO^* + \theta\rho_d \Delta SALEDOM^* + \epsilon \quad (4a)$$

$$\Delta PIDOM = \beta_0 + \gamma\rho_f \Delta SALEFO^* + (1-\theta)\rho_d \Delta SALEDOM^* + u \quad (4b)$$

$\Delta\, PIFO$ is (foreign earnings in year *t* – foreign earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta\, PIDOM$ is (domestic earnings in year *t* – domestic earnings in year *t-1*), scaled by total assets in year *t-1*. $\Delta\, SALEFO$ is (foreign sales in year *t* – foreign sales in year *t-1*), scaled by total assets in year *t-1*. $\Delta\, SALEDOM$ is (domestic sales in year *t* – domestic sales in year *t-1*), scaled by total assets in year *t-1*.

In all models, $\theta = \theta_0 + \sum_c \theta_c C$, $\gamma = \gamma_0 + \sum_c \gamma_c C$, , $\rho f = \rho f_0 + \sum_c \rho f_c C$, and $\rho d = \rho d_0 + \sum_c \rho d_c C$, where *C* is a vector of control variables: $WW\ RETURN\ ON\ SALES$, $R\&D\ EXPENSE$, $ADVERTISING\ EXPENSE$, $FOREIGN\ TO\ TOTAL\ SALES$, $CASH\ TO\ ASSETS$, $DEBT\ TO\ ASSETS$, $INTANGIBLE\ TO\ TOTAL\ ASSETS$, and $SIZE$. The proxy for financial constraints is SIZE is $JUNK\ RATING$ in column one, $SA\ INDEX$ in column 2, and $NODIVIDENDS$ in column 3. *SIZE* is excluded from the column labeled *SA INDEX* because *SA INDEX* is a function of *SIZE*.

As shown in the appendix, the substitutions required to estimate the equations result in models with a number of interactive terms. To facilitate interpretation of the coefficients, all variables except indicator variables are mean-centered so that the coefficients can be interpreted as the effect of the variable on the hypothetical mean firm.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.
Standard errors are clustered by firm and by year.
t-statistics are reported in parentheses under each estimate.