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**EXPOSURE TO FOREIGN EXCHANGE RISK, HEDGING, AND
TAX-MOTIVATED OUTBOUND SHIFTING**

A Dissertation in

Business Administration

by

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ABSTRACT

Although outbound income shifting to low-tax jurisdictions provides tax savings, it is often accompanied by nontax costs. In this study, I examine whether the ex-ante foreign exchange (FX) exposure constrains tax-motivated outbound shifting by U.S. multinationals. My findings indicate that larger FX exposure is associated with less outbound shifting for tax incentives by U.S. firms. This constraining effect is greater for firms with relatively more foreign affiliates using foreign currencies as their functional currencies or for those with affiliates in countries with riskier local currencies. I also investigate whether hedging facilitates tax-motivated outbound shifting. I find that U.S. firms with a greater extent of currency hedging tend to shift more income offshore for tax incentives, consistent with the conjecture that cost-effective hedging lowers FX exposure cost. Overall, these findings suggest that FX exposure is an important nontax cost of tax-motivated outbound shifting.

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Chapter 1

INTRODUCTION

Tax-motivated income shifting by U.S. multinational corporations (MNCs) has attracted significant attention in recent years. The popular press has consistently released articles with anecdotal evidence suggesting that U.S. MNCs engage in extensive outbound shifting.¹ However, empirical estimates show only a modest magnitude of outbound shifting, raising the question of why more income is not shifted offshore (Dharmapala [2014]). One potential explanation is that when firms engage in outbound shifting, they incur significant nontax costs that constrain their ability to take full advantage of these opportunities. With a few exceptions in the extant literature, we have a very limited understanding about the nontax trade-offs U.S. MNCs face when they make outbound shifting decisions (Blouin [2012]; Dharmapala [2014]).²

A largely overlooked nontax cost of outbound shifting in the literature is the ex-ante exposure to foreign exchange risk (“FX exposure” hereafter).³ When earnings denominated in foreign currencies are shifted offshore for tax incentives, they will be susceptible to future exchange rate movements. During the last two decades, U.S.

¹See, for example, the following two New York Times articles: “Profitable Companies, No Taxes: Here’s How They Did It” (available at <https://www.nytimes.com/2017/03/09/business/economy/corporate-tax-report.html>) and “After a Tax Crackdown, Apple Found a New Shelter for Its Profits” (available at <https://www.nytimes.com/2017/11/06/world/apple-taxes-jersey.html>).

²These exceptions include Klassen and Laplante [2012b], Dyreng and Markle [2016], Chen, Hepfer, Quinn, and Wilson [2018], and Gallemore, Huang, and Wentland [2018]. See Section 2.1 for more details.

³Foreign exchange (FX) risk, also known as currency risk or exchange rate risk, is the financial risk that earnings and investments denominated in foreign currencies will change in value due to exchange rate movements. Currency risk should not be confused with currency exposure; currency risk arises from unexpected exchange rate variations, whereas currency exposure represents the amount at risk (Alder and Dumas [1984]). The ex-ante FX exposure is the exposure to FX risk before risk management. Unless specifically stated as “net FX exposure” (which is the exposure after risk management efforts such as hedging), throughout this study the phrase “FX exposure” is always referred to as the ex-ante FX exposure.

MNCs have become increasingly concerned about FX exposure due to the significant increase in exchange rate volatility (Apte [2010]). Large FX exposure is likely to cause greater volatility in earnings and depreciation in monetary asset values. For example, the surge in the U.S. dollar (USD) against foreign currencies in 2015 depressed earnings at many major U.S. MNCs.⁴ In addition, the massive devaluation of Venezuela's bolivar in the same year almost “[wiped] out the \$7.1 billion of Venezuelan monetary assets currently held on the books of 10 large American companies” (McLaughlin and Valdmanis [2015]). Despite the growing concern with FX exposure among U.S. MNCs, managing currency risk presents the biggest challenge for their treasurers (Deloitte [2017]). Effective hedging can be costly in that it requires accurate exposure information, reliable transaction forecasts, and on-going risk monitoring (Deloitte [2016]). Therefore, a significant FX exposure is likely to dampen the attractiveness of outbound shifting due to the greater uncertainty about future financial outcomes and/or hedging costs.

This study examines whether FX exposure constrains U.S. MNCs' tax-motivated outbound shifting activities. To examine this question, I measure FX exposure using the five-year average ratio of foreign sales to total sales ($Fsales\%$) and estimate income shifting using the approach developed by Collins, Kemsley, and Lang [1998] with the multiperiod regression variables suggested by Klassen and Laplante [2012b]. Based on the reasons discussed above, I predict that larger FX exposure is associated with less income shifted outbound for tax incentives. Nonetheless, it is possible that U.S. firms are able to eliminate FX exposure of shifted income by invoicing foreign sales in USD or investing shifted income in U.S. dollar assets, such as U.S.

⁴See the article “Strong Dollar Squeezes U.S. Firms” (available at <https://www.wsj.com/articles/strong-dollar-hangs-over-more-companies-rattling-investors-1422386620>).

government and corporate bonds (U.S. Senate Permanent Subcommittee on Investigations [2011]). Therefore, it is an empirical question whether FX exposure affects tax-motivated outbound shifting.

Using a sample of U.S. MNCs with an incentive to shift income out of the U.S. from 1988 to 2016, I examine how the outbound shifting intensity varies cross-sectionally with FX exposure. I find that FX exposure is negatively associated with tax-motivated outbound shifting, consistent with the expectation that U.S. MNCs with larger FX exposure find the tax planning strategy more costly. The economic magnitude is fairly large; a ten percentage point decrease in average foreign tax rates translates into an additional \$33 million of income shifted out of the U.S. by a less exposed firm relative to a highly exposed firm (defined as an $Fsales^0\%$ in the 25th percentile versus 75th percentile).

To better understand the relation between FX exposure and tax-motivated outbound shifting, I examine two cross-sectional settings where I expect the effect of FX exposure to be stronger. The first setting relates to foreign affiliates' functional currencies. In general, a foreign affiliate's functional currency "is the currency of the environment in which [the] entity primarily generates and expends cash" (ASC 830-10-45-2). Since FX exposure is more costly for firms with relatively more foreign affiliates denominating earnings in foreign currencies, I predict the effect of FX exposure on tax-motivated outbound shifting to be greater for those firms with relatively more foreign affiliates using foreign currencies as their functional currencies. Using unsigned changes in the cumulative translation adjustment (CTA) account reported in the equity section to proxy for the extent of foreign affiliates using foreign currencies as their functional currencies (Robinson and Stocken [2013]), I find evidence consistent with this prediction.

The second cross-sectional setting relates to the riskiness of foreign currencies. Ex-ante, a currency is perceived as riskier than others if its exchange rate against the USD is historically highly volatile or the currency is expected to depreciate against the USD in the future. Accordingly, I define a currency as ex-ante riskier if its exchange rate has been more volatile in the past five years compared to other currencies or the currency is expected to depreciate against the USD in the future, as observed by a greater purchasing power parity (PPP) conversion rate relative to the current exchange rate (Abuaf and Jorion [1990]). Given an FX exposure level, I expect firms with affiliates in countries with riskier local currencies to suffer more from currency risk. Consistent with this rationale, I find that the constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with affiliates in countries with riskier local currencies.

Next, I investigate whether risk management through hedging facilitates tax-motivated outbound shifting. Hedging can improve the profitability of tax-motivated outbound shifting by lowering FX exposure cost. If a firm engages in extensive hedging activities such that it finds hedging cost-effective and its shifted income will be better protected from FX risk, the firm will be more likely to engage in tax-motivated outbound shifting. To test this prediction, I use both financial and operational hedging measures developed from firms' discussions on derivative usage in their 10-K reports and disclosures of their foreign subsidiary locations (Exhibit 21), respectively. Overall, my test results provide evidence that hedging is positively associated with outbound shifting for tax incentives.

In addition to the cross-sectional tests mentioned previously, I further employ two tests to rule out alternative explanations for my main finding. First, I address concerns that FX exposure is driven by the exposure to foreign political instability

leading to a negative effect on tax-motivated outbound shifting. To rule out this possibility, I further control for a firm's weighted-average foreign political stability score in a robustness test, which provides results quantitatively similar to those obtained in my main test. Second, to alleviate concerns that the ex-ante FX exposure measure, $F_{sales\%}$, captures other firm characteristics that are unrelated to currency risk but relevant to a firm's income shifting decisions, I examine whether more tax-motivated outbound shifting is associated with larger net FX exposure (i.e., FX exposure after risk management). In this setting, net FX exposure is measured using the estimated coefficients of a dollar index from stock return regressions as opposed to financial variables and is therefore unlikely to capture unrelated firm characteristics. The test results are consistent with my expectation that shifting income outbound for tax incentives increases a firm's net exposure to currency risk.

In my final analysis, I verify the assumption that U.S. MNCs are concerned about potential depreciation of cash value caused by FX movements. I first investigate whether their cash holdings in foreign currencies are non-trivial. Due to data constraints, I use the amount of cash flows due to exchange rate changes reported in the consolidated statement of cash flows to proxy for foreign currency cash holdings. I find that the average (median) appreciated/depreciated cash value in the current year is 4% (2%) of the total cash value in the previous year, indicating that U.S. MNCs hold reasonably large amounts of foreign currencies not pegged to the dollar. With this proxy, I then examine whether foreign currency cash holdings are positively associated with FX exposure because firms with larger FX exposure should have a greater portion of cash held in foreign currencies. I find strong evidence in support of this prediction.

The findings of this study offer several contributions. First, they contribute to the income shifting literature by shedding light on whether FX exposure is a nontax cost to U.S. MNCs in their tax-motivated outbound shifting decisions and thus helps to explain the heterogeneity in their multi-jurisdictional tax planning behavior.⁵ Although a significant body of literature is devoted to estimating tax-motivated income shifting (see Dharmapala [2014] for a review), there is limited evidence of nontax costs that deter these activities. In this study, I document direct evidence that U.S. MNCs with large FX exposure shift less income outbound for tax incentives, which highlights the friction U.S. MNCs face when they engage in opportunistic tax planning activities.

Second, these findings contribute to the derivative hedging literature. A stream of research in this area attempts to investigate the benefits of using hedging instruments. Prior studies find that firms' use of derivatives is associated with less discretionary accruals (Barton [2001]), a higher firm value (Allayannis and Weston [2001]), and a lower cost of equity (Gay, Lin, and Smith [2011]) through reduced earnings volatility and increased expected future cash flows. In connection with tax research, Donohoe [2015] documents the prevalence of derivative-based tax avoidance on the grounds that hedging lowers expected taxes (by smoothing taxable income) and allows firms to take advantage of the ambiguity in derivatives taxation rules. In this study, I provide evidence that hedging facilitates tax-motivated income shifting

⁵Related literature attempts to examine whether currency risk affects cross-border investments. Studies in this line of research do not find consistent evidence that currency risk is of first-order importance to foreign investment decisions (Cushman [1985]; Froot and Stein [1991]; Harris and Ravenscraft [1991]; Cebenoyan, Papaioannou, and Travlos [1992]; Kang [1993]; Dewenter [1995a] and [1995b]; Erel, Liao, and Weisbach [2012]; Dewenter, Schrand, and Wang [2016]). My study differs from those in the cross-border investment literature in that I examine the effect of FX exposure on outbound income shifting via *tax-motivated* foreign direct investments. In this setting, currency risk is likely to have a first-order effect because tax-motivated investments are often less profitable than cross-border investments made for business expansion purposes.

by lowering the FX exposure cost, which is another channel through which hedging facilitates tax avoidance.

Third, my findings contribute to the net exchange rate exposure literature. There is a long line of research investigating the determinants of a firm's net FX exposure. The extant literature has identified several factors, such as ex-ante FX exposure (Jorion [1990]), hedging (Allayannis and Ofek [2001]; Bartram, Brown, and Fehle [2009]; Pantzalis, Simkins, and Laux [2001]), size (Bodnar and Wong [2003]; Chow, Lee, and Solt [1997]), and intra-industry competition (Deminguez and Tesar [2006]; Marston [2001]; Williamson [2001]). In this study, I provide evidence that a firm's tax-motivated outbound shifting activities are a significant determinant of its net FX exposure.

Last, my results provide another explanation of why firms domiciled in countries with territorial tax systems ("territorial firms") tend to shift more income than those under worldwide tax systems ("worldwide firms"). A common explanation for this phenomenon is that worldwide firms cannot always indefinitely delay home country taxes on foreign earnings and therefore experience lower profitability for outbound shifting (Markle [2016]). The evidence presented in this study suggests that this lower profitability can also be explained by a greater portion of shifted income being exposed to currency risk for worldwide firms. This is because, unlike territorial firms that have the freedom to repatriate foreign earnings and invest them in domestic projects, worldwide firms are required to keep shifted income in host countries for a sufficient period of time in order to reap the expected tax benefits. For this reason, FX exposure is more costly for worldwide firms than for territorial firms.

The U.S. enacted the Tax Cuts and Jobs Act (TCJA) in 2018 and made several changes to corporate taxation. These changes include a reduction of the top statutory

tax rate to 21 percent, adoption of a territorial system, and the introduction of the base erosion and anti-abuse tax (BEAT). While it is difficult to predict exactly how U.S. MNCs' outbound shifting behavior will change, the increased disincentive to shift income offshore due to a lower statutory tax rate and a larger regulatory cost (through the BEAT) is likely neutralized by the switch to a territorial system. To the extent that the TCJA results in a net increase in U.S. MNCs' incentive to shift income offshore due to the lowered outbound shifting costs under the new territorial system, the U.S. tax base will continue to decline.

Chapter 2

BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 U.S. worldwide tax rules and income shifting

Prior to the enactment of the TCJA in 2018, the U.S. taxed its corporations on worldwide income but did not require tax payments on active foreign earnings until repatriation (i.e., deferral regime).⁶ U.S. corporations were then granted foreign tax credits for income taxes paid to foreign governments limited to the amount that would otherwise be due had the income been earned in the U.S. In general, U.S. MNCs with lower (higher) foreign tax rates would owe residual taxes (no taxes) to the U.S. government upon repatriation of foreign earnings.

U.S. MNCs had strong incentives to report taxable income in low-tax offshore locations before the TCJA for two reasons. First, the deferral regime enabled U.S. firms to reduce repatriation tax costs through time value of money. Second, the U.S. had comparatively higher corporate tax rates than other countries.⁷ Therefore, many U.S. MNCs sent their profits overseas to avoid paying U.S. taxes at a higher rate – a tax planning strategy commonly known as “tax-motivated outbound shifting.”

Generally, outbound shifting can be accomplished through transfer pricing and investment location decisions. A U.S. MNC can lower its tax burden by manipulating intra-company transfer prices between the U.S. parent and its foreign affiliates (e.g., a price effect). These related-party transactions/arrangements often involve sales of

⁶The Subpart F provisions of U.S. tax law disallowed tax deferral for certain categories of passive income earned by controlled foreign corporations. These provisions are still present in the current U.S. tax law.

⁷The average top statutory corporate tax rate for Organization for Economic Cooperation and Development (OECD) countries excluding the U.S. gradually declined from approximately 35% in 1993 to less than 25% in 2016, whereas the U.S. tax rate remained at 35% for the same period.

inventory, services, licensing or sales of intangible assets, and cost sharing agreements (Joint Committee on Taxation [2010]).⁸ In contrast, the location decision requires investing profitable operating activities in low-tax countries (e.g., a location effect). These tax-motivated foreign operations can erode the U.S. tax base by (1) selling directly to U.S. customers, (2) serving as upstream suppliers or downstream manufacturers of domestic affiliates, or (3) replacing U.S. exports with local foreign sales. Extant literature has documented compelling evidence of tax-motivated income shifting through both transfer pricing and strategic investment location channels.⁹

In light of a large number of studies that attempt to estimate income shifting, research in this area has gradually shifted to the explanation of the behavior. A number of firm characteristics have been found to increase the propensity for income shifting, such as R&D expenses (Harris [1993]; De Simone, Huang, and Krull [2016]), the growth phase of foreign subsidiaries (Klassen and Laplante [2012a]), tax haven operations (Desai, Foley, and Hines [2006]), high-tech operations (De Simone, Mills, and Stomberg [2019]), financial reporting incentives (Klassen and Laplante [2012a]; Krull [2004]), and internal information quality (McGuire, Rane, and Weaver [2017]). With regard to nontax costs, a few prior studies provide direct evidence that U.S. MNCs shift less income outbound when the regulatory, external financing, or patent protection cost is high (Klassen and Laplante [2012b]; Dyreng and Markle [2016]; Gallemore et al. [2018]). Related studies also show that income shifting increases information asymmetry (Chen et al. [2018]) and that trapped cash overseas can lead

⁸Although the U.S. had extensive anti-base erosion rules that required inter-company transaction prices to be at arm's length (Internal Revenue Code Section 482), MNCs often had the discretion to set up favorable transfer prices due to the lack of identical products or assets in the market.

⁹See, for example, Clausing [2003], Collins et al. [1998], Dyreng and Markle [2016], Hines and Rice [1994], Klassen and Laplante [2012a] and [2012b], and Swenson [2001] for studies on transfer pricing. Studies on tax-motivated foreign investments include Altshuler, Grubert, and Newlon [2000], Devereux and Griffith [1998], Grubert and Mutti [1991] and [2000], and Hines and Rice [1994].

to value-destroying investment decisions and lower values of cash holdings (Hanlon, Lester, and Verdi [2015]; Edwards, Kravet, and Wilson [2016]; Chen [2014]; Campbell, Dhaliwal, Krull, and Schwab [2018]). I extend this line of research by focusing on FX exposure issues associated with outbound shifting.

2.2 Foreign exchange exposure and hedging

A firm's currency risk exposure can be assessed from an ex-ante or ex-post perspective. The ex-ante exposure represents the amount at risk before actively managing the risk. In contrast, the ex-post exposure, or net exposure, represents the residual exposure after risk management. In general, the ex-ante FX exposure determines the need for risk management, and both the ex-ante FX exposure and the extent of risk management determine the amount of net FX exposure (Géczy, Minton, and Schrand [1997]; Allayannis and Ofek [2001]; Pantzalis et al. [2001]). Based on these links, the ex-ante FX exposure captures the total expected costs of investments in currency risk management as well as net FX exposure.

During the last two decades, U.S. MNCs have become increasingly concerned about FX exposure due to the significant increase in exchange rate volatility (Apte [2010]). Large FX exposure is likely to cause greater volatility in earnings and depreciation in monetary asset values, which may in turn increase stock volatility and deteriorate financial ratios used as inputs into credit ratings. Despite the growing concern with FX exposure among U.S. MNCs, managing currency risk presents the biggest challenge for their treasurers (Deloitte [2017]). This is because effective risk management, such as hedging, requires accurate exposure information, reliable transaction forecasts, and on-going risk monitoring (Deloitte [2016]).

Despite those challenges, many U.S. MNCs hedge FX exposure to mitigate currency risk. Bodnar and Gebhardt [1999] report that 57% of non-financial U.S.

MNCs use derivative instruments including forwards, futures, and swaps. Bodnar, Hayt, and Marston [1998] find that derivative usage increased during the period 1994 – 1998; however, the majority of firms hedged less than 50% of their FX exposure in their 1998 survey. In addition to financial hedges, Pantzalis et al. [2001] document evidence that U.S. MNCs engage in operational hedges to reduce FX exposure, such as spreading foreign operations among multiple currency areas and avoiding concentrated operations in a few foreign countries. However, operational hedges are often more costly to implement than financial hedges because the former require the relocation of production and sales activities (Treanor, Carter, Rogers, and Simkins [2013]).

2.3 Hypothesis development

Tax-motivated outbound shifting can expose foreign currency earnings to FX risk. When shifted income is kept in the form of foreign currency monetary assets (e.g., cash), it will be subject to devaluation in the case of adverse exchange rate movements. Alternatively, when shifted income is reinvested in foreign productive assets or used to acquire foreign businesses, a greater portion of future consolidated earnings will be foreign, thus creating a larger earnings volatility due to foreign currency translation. Therefore, if a U.S. MNC is highly exposed to FX risk ex-ante, such that devaluation of cash and financial reporting costs are likely to arise, shifting income outbound for tax incentives will be less beneficial for the firm. Based on this rationale, I predict:

H1: *U.S. MNCs with larger FX exposure shift less income out of the U.S. for tax incentives.*

It is possible that FX exposure has no impact on tax-motivated outbound shifting for at least two reasons. First, U.S. MNCs can shift FX risk to their customers by invoicing sales in USD so that foreign earnings will be immune to exchange rate fluctuations. Second, they can invest shifted earnings in U.S. passive assets, such as government and corporate bonds, to avoid cash devaluations (U.S. Senate Permanent Subcommittee on Investigations [2011]). If U.S. MNCs are able to utilize various techniques to limit the effect of exchange rates on shifted income, I will find no evidence in support of H1.

To better understand the relation between FX exposure and tax-motivated outbound shifting, I examine two cross-sectional settings where I expect the effect of FX exposure to be stronger. The first setting relates to foreign affiliates' functional currencies. A U.S. parent is required to determine a functional currency for each of its foreign subsidiaries. "Normally, that is the currency of the environment in which an entity primarily generates and expends cash" (ASC 830-10-45-2). By definition, a foreign subsidiary's functional currency indicates the currency in which the subsidiary makes its operating, investing, and financing decisions (Robinson and Stocken [2013]). Since FX exposure is more costly for firms with relatively more foreign affiliates denominating earnings in foreign currencies, I expect the effect of FX exposure on tax-motivated outbound shifting to be greater for these firms. I develop my second hypothesis:

H2: *The constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with relatively more foreign affiliates using foreign currencies as their functional currencies.*

The second setting relates to the riskiness of foreign currencies. Ex-ante, a currency is perceived as riskier than others if its exchange rate against the USD is historically highly volatile or the currency is expected to depreciate against the USD in the future. Conditional on FX exposure level, I expect firms with affiliates in countries with riskier local currencies to suffer more from currency risk, such as larger earnings volatility and depreciation of monetary assets. Based on this expectation, I form my third hypothesis:

H3: *The constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with foreign affiliates in countries with riskier local currencies.*

To shed light on whether currency risk management facilitates tax-motivated outbound shifting, I investigate the relation between U.S. MNCs' currency hedging activities and their tax-motivated outbound shifting intensity. Hedging can improve the profitability of tax-motivated outbound shifting because it lowers the FX exposure of shifted income. Although hedging is not cost-free, it is generally beneficial for a firm to hedge when the cost of hedging is lower than the cost of FX exposure being hedged against. If a firm engages in extensive hedging activities such that it finds hedging cost-effective and its shifted income will be better protected from FX risk, the firm will be more likely to shift income outbound for tax incentives.¹⁰ This leads to my fourth hypothesis:

¹⁰A close examination of U.S. firms' 10-K reports shows that short-term derivative contracts (with maturity less than a year) are most commonly used, which is consistent with Bodnar et al. [1998]. The costs of financial hedging include establishing and maintaining a hedging program (e.g. fixed costs) and purchasing/selling derivative contracts (e.g., variable costs). A few firms in the sample of this study have disclosed that the cost of an annual option contract is approximately 1-2% of the

H4: *U.S. MNCs with a greater extent of currency hedging tend to shift more income out of the U.S. for tax incentives.*

total notional value. This indicates that the longer a firm delays repatriation, the more costly hedging FX exposure becomes.

Chapter 3

RESEARCH DESIGN AND DATA

3.1 Research design

I measure FX exposure as the five-year average foreign sales ratio ($Fsales\%$), calculated as the sum of total foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. This measure captures the total expected costs of investments in currency risk management as well as net FX exposure and is in line with a large number of studies that have documented that the foreign sales ratio is a crucial determinant of a firm's financial hedging activities (Bartram et al. [2009]; Bodnar et al. [1998]; Géczy et al. [1997]; Allayannis and Ofek [2001]) and net FX exposure (Allayannis and Ofek [2001]; Jorion [1990]; Pantzalis et al. [2001]; Bodnar and Wong [2003]; Wong [2000]; Bartram [2004]; Zhang [2009]). Consistent with Dyreng and Markle [2016], I assume that a firm cannot manipulate the location of its customers and, therefore, the foreign sales ratio cannot be affected by the firm's income shifting activities. In developing $Fsales\%$, I use multiperiod values to mitigate the potential measurement error due to the inclusion of translation adjustments in reporting geographic sales by U.S. firms.

To estimate income shifting, I adopt the approach developed by Collins et al. [1998] but use the multiperiod measures suggested by Klassen and Laplante [2012b]. Motivated by Dyreng and Markle [2016], I add several firm-level control variables that are likely correlated with accounting profitability and FX exposure to the baseline model. To test H1, I examine how the income shifting intensity varies based on the level of FX exposure:

$$FROS_{i,t} = \beta_0 + \beta_1 FTR_{i,t} + \beta_2 Fsales\%_{i,t-4} + \beta_3 FTR * Fsales\% + \Sigma \beta_{4n} Controls_{i,t} + \Sigma \beta_{5k} IND_{i,t} + \Sigma \beta_{6t} YEAR_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where:

- $FROS_{i,t}$ = Sum of foreign pre-tax income (t-4 to t) / sum of foreign sales (t-4 to t);
- $FTR_{i,t}$ = Sum of foreign taxes (t-4 to t) / sum of foreign pre-tax income (t-4 to t) - sum of U.S. statutory tax rates (t-4 to t) / 5;
- $Fsales\%_{i,t-4}$ = Sum of total foreign sales (t-8 to t-4) / sum of total sales (t-8 to t-4);
- $Controls_{i,t}$ = A vector of firm-level control variables in five-year average values (t-4 to t), including worldwide return on sales (*ROS*), R&D expenses scaled by total assets (*R&D*), advertising expenses scaled by total assets (*Ads*), intangible assets scaled by total assets (*Intan*), cash scaled by total assets (*Cash*), debt scaled by total assets (*Debt*), and firm size (*Size*);
- IND = A vector of industry indicator variables; and
- $YEAR$ = A vector of year indicator variables.

In Equation (1), *FTR* captures a firm's long-run incentive to shift income. For simplicity, firm-years with a negative (positive) *FTR* value are referred to as "potential outbound (inbound) shifters" throughout this study. I demean both *FTR* and *Fsales%* when interacting the two variables. Therefore, the coefficient of *FTR* measures the extent of income shifting for U.S. MNCs with an average FX exposure level and is expected to be negative. I measure *Fsales%* at year t-4 to examine how FX exposure affects a firm's long-run outbound shifting activities. According to H1,

I predict a positive coefficient on $FTR * Fsales\%$ among the potential outbound shifters.

Hypothesis 2 predicts that the constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with relatively more foreign affiliates using foreign currencies as their functional currencies. To measure the extent of foreign affiliates using foreign currencies as their functional currencies, I focus on changes in the CTA account reported in the equity section, as suggested by Robinson and Stocken [2013]. This is because the effects of changes in exchange rates are recognized in accumulated other comprehensive income on the balance sheet when an affiliate's functional currency is the host country's currency.¹¹ I further define the variable $Abs_ΔCTA$ as the absolute change in the consolidated CTA account scaled by lagged assets; larger $Abs_ΔCTA$ values indicate more foreign affiliates using foreign currencies as their functional currencies.

To examine H2, I estimate the following regression:

$$\begin{aligned}
 FROS_{i,t} = & Low_ΔCTA_{i,t-4} * (\beta_{L0} + \beta_{L1} FTR_{i,t} + \beta_{L2} Fsales\%_{i,t-4} + \beta_{L3} FTR * \\
 & Fsales\% + \Sigma \beta_{L4n} Controls_{i,t}) + High_ΔCTA_{i,t-4} * (\beta_{H0} + \\
 & \beta_{H1} FTR_{i,t} + \beta_{H2} Fsales\%_{i,t-4} + \beta_{H3} FTR * Fsales\% + \\
 & \Sigma \beta_{H4n} Controls_{i,t}) + \Sigma \beta_{5k} IND_{i,t} + \Sigma \beta_{6t} YEAR_t + \varepsilon_{i,t}, \quad (2)
 \end{aligned}$$

where $Low_ΔCTA$ ($High_ΔCTA$) is a dichotomous variable taking the value of one if $Abs_ΔCTA$ is smaller (larger) than the median, and zero otherwise. Similar to $Fsales\%$, I measure $Low_ΔCTA$ and $High_ΔCTA$ at year t-4. In Equation (2), I

¹¹FX translation effects will be recognized on the income statement if the affiliate's functional currency is USD.

expect the coefficient on $FTR * Fsales\%$ for the *High_ΔCTA* group (β_{H3}) to be greater than that for the *Low_ΔCTA* group (β_{L3}).

Hypothesis 3 predicts that the constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with foreign affiliates in countries with riskier local currencies. To examine this possibility, I measure a firm's currency risk in two ways. First, I measure a currency's stability by averaging the exchange rate stability risk points for that currency over the period t-4 to t (see Section 3.2 for data description). I then construct a firm-level continuous measure (*RXStability*) by weighting the currency-level mean risk point using the ratio of the number of subsidiaries located in a jurisdiction using that currency to the total number of foreign subsidiaries. Larger values of *RXStability* indicate less currency volatility at the firm level. To classify firms into low or high currency risk groups, I define *Low_Risk* (*High_Risk*) equal to 1 if *RXStability* is greater (less) than the sample median, and 0 otherwise.

Second, I measure a currency's likelihood of depreciation against the USD by examining the ratio of the currency's PPP conversion rate to the current exchange rate (Huizinga [1987]; Abuaf and Jorion [1990]; Chen [1995]; Sarno and Taylor [2002]). A ratio greater than 1 indicates that the currency is overvalued relative to the PPP conversion rate and thus expected to depreciate in the future. Similar to *RXStability*, I construct a firm-level continuous measure (*PPP_RX*) by weighting the currency-level mean PPP-to-change-rate ratio (computed over t-4 through t) using the ratio of the number of subsidiaries located in a jurisdiction using that currency to the total number of foreign subsidiaries. Since the value of *PPP_RX* has to be sufficiently greater than 1 to indicate a greater likelihood of future depreciation,

I define *Low_Risk* (*High_Risk*) equal to 1 if *PPP_RX* is below (above) the top decile, and 0 otherwise based on the distribution of *PPP_RX* (see Table 1).

After assigning firms into *Low_Risk* or *High_Risk* groups using the two currency risk measures discussed above, I estimate the following regression to examine H3:

$$\begin{aligned}
 FROS_{i,t} = & Low_Risk_{i,t-4} * (\beta_{L0} + \beta_{L1} FTR_{i,t} + \beta_{L2} Fsales\%_{i,t-4} + \beta_{L3} FTR * \\
 & Fsales\% + \Sigma \beta_{L4n} Controls_{i,t}) + High_Risk_{i,t-4} * (\beta_{H0} + \\
 & \beta_{H1} FTR_{i,t} + \beta_{H2} Fsales\%_{i,t-4} + \beta_{H3} FTR * Fsales\% + \\
 & \Sigma \beta_{H4n} Controls_{i,t}) + \Sigma \beta_{5k} IND_{i,t} + \Sigma \beta_{6t} YEAR_t + \varepsilon_{i,t} \quad (3)
 \end{aligned}$$

I measure *Low_Risk* and *High_Risk* at t-4 to capture the currency risk level at the beginning of the multiperiod income shifting incentive measure. Based on H3, I expect the coefficient on *FTR * Fsales%* for the *High_Risk* group (β_{H3}) to be greater than that for the *Low_Risk* group (β_{L3}).

To test H4, which investigates the relation between currency hedging and tax-motivated outbound shifting, I estimate the following regression:

$$\begin{aligned}
 FROS_{i,t} = & Low_Exposure_{i,t-4} * (\delta_{L0} + \delta_{L1} FTR_{i,t} + \delta_{L2} Hedge_{i,t-4} + \delta_{L3} FTR * \\
 & Hedge + \Sigma \delta_{L4n} Controls_{i,t}) + High_Exposure_{i,t-4} * (\delta_{H0} + \\
 & \delta_{H1} FTR_{i,t} + \delta_{H2} Hedge_{i,t-4} + \delta_{H3} FTR * Hedge + \\
 & \Sigma \delta_{H4n} Controls_{i,t}) + \Sigma \delta_{5k} IND_{i,t} + \Sigma \delta_{6t} YEAR_t + \epsilon_{i,t}, \quad (4)
 \end{aligned}$$

where *Low_Exposure* (*High_Exposure*) is an indicator variable taking the value of 1 if *Fsales%* is below (above) the sample median, and 0 otherwise; *Hedge* is a measure of either financial or operational currency hedging (see below). I split the sample based on high or low FX exposure level to allow for any variation in the effect of hedging between the two exposure groups. I measure *Hedge* at t-4 to examine the

association between hedging and long-run outbound shifting. In testing Equation (4), I demean *Hedge* and *FTR* when they are both continuous measures and interacted with each other. I predict the coefficient on *FTR * Hedge* to be negative for both exposure groups.

I use two alternative measures for financial hedging. I first define *FCD* as an indicator variable taking the value of 1 if a firm has outstanding financial currency derivatives at year-end, and 0 otherwise.¹² This measure captures whether a firm has a hedging program in a specific year. To measure the degree of financial hedges, I use the size of currency derivatives (*FCD_at*), calculated as the notional value of all currency contracts at year-end scaled by total assets. This continuous measure allows me to examine how the size of financial hedging affects tax-motivated outbound shifting.

Following Pantzalis et al. [2001], I construct two proxies for operational hedges based on the location of foreign subsidiaries. The first measure is a firm's multinational network breadth (*ln_Breadth*), computed as the natural log of the number of distinct foreign countries where a firm has operations. Firms with larger network breadth have more diversified foreign operations across many currency areas to limit the impact of large changes in the value of a specific currency. The second measure is a firm's multinational network depth (*Depth*), calculated as -1 multiplied by the ratio of the number of foreign subsidiaries in the top two foreign countries to the total number of foreign subsidiaries. Network depth captures concentration of foreign affiliates in a few foreign jurisdictions; larger values of *Depth* indicate less concentrated foreign operations and hence a less concentrated currency risk.

¹²Currency derivatives include forward, future, and option contracts. I exclude currency swaps because they are often used in conjunction with hedging interest rate risk.

3.2 Sample selection and data

My main sample consists of potential outbound shifters ($-1 \leq FTR < 0$) with non-missing data on the primary regression variables in Equation (1). I start my sample from 1988 because it is the earliest fiscal year where firms have non-missing historical financial data to compute the *FTR* values.¹³ I end my sample in 2016, which is the year of commencement for this study. During this sample period, the U.S. used a worldwide tax regime and it remained uncertain whether a territorial regime would take place. Consistent with prior studies in the income shifting literature, I exclude non-U.S. firms, financial institutions (SIC codes 6000–6999), and utilities (SIC codes 4900–4999). I further remove loss firms because the income shifting incentive for these firms is difficult to predict. The main sample consists of 6,674 observations and the sample size for subsequent tests varies depending on the availability of other data.

I collect data from several databases to construct variables used in this study, all of which are defined in the Appendix. The majority of financial information and all stock return data are retrieved from Compustat and CRSP respectively. For variables involving the location of foreign subsidiaries, I obtain Exhibit 21 disclosures from the EX-21 Dataset provided by Scott Dyreng, who first used the data in Dyreng and Lindsey [2009]. The dataset covers fiscal years from 1993 (i.e., the first year of company filings on EDGAR) through 2014. Country risk points for exchange rate stability are provided by the International Country Risk Guide. The annual risk points are calculated over a calendar year and range from 0 to 10, with a larger

¹³ Statement of Financial Accounting Standards 109 became effective for fiscal years beginning after December 15, 1992, which made income tax reporting more consistent for years following the enactment. Changing the sample period to 1993 – 2016 does not affect the results for all empirical analyses in this study.

number indicating a more stable currency. The ratio of PPP to the market exchange rate is downloaded from the World Bank's International Comparison Program database. Finally, to obtain information on currency derivative hedges, I manually examine management's discussions on FX risk and currency derivative usage in firms' 10-K filings.

Table 1 presents the descriptive statistics. All continuous variables are winsorized at the 1% and 99% percentiles except for *FTR*, which is restricted to [-1,0]. As expected, the mean value of *FROS* (0.14) is larger than the mean value of *ROS* (0.12), indicating potential outbound shifting activities. The average foreign tax rate (*FTR*) is 13 percentage points below the top U.S. statutory tax rate over the sample period. The mean *Fsales%* is 35%, suggesting a significant FX exposure for an average U.S. MNC. For the merged sample with non-missing Exhibit 21 disclosures, the mean (median) *ln_Breadth* and *Depth* are 2.44 (2.64) and -0.42 (-0.32) respectively. In terms of financial hedging (*FCD*), 61% of the firm-years in the sample have currency derivatives outstanding at year-end, similar to the observation by Bodnar and Gebhardt [1999]. The mean notional value of these currency derivatives (*FCD_at*) is roughly 5% of total asset value.¹⁴

¹⁴The sample size for *FCD_at* is smaller than that for *FCD* because some firms do not disclose the notional amount of their hedging instruments.

Table 1
Descriptive Statistics

Variable	N	Mean	p25	p50	p75	Std Dev
<i>FROS</i>	6,674	0.14	0.06	0.10	0.17	0.14
<i>FTR</i>	6,674	-0.13	-0.18	-0.11	-0.05	0.11
<i>Fsales%</i>	6,674	0.35	0.18	0.35	0.49	0.20
<i>Abs_Delta_CTA</i>	6,362	0.01	0.00	0.01	0.01	0.01
<i>RXStability</i>	3,646	9.25	9.11	9.34	9.59	0.48
<i>PPP_RX</i>	3,660	0.89	0.79	0.89	1.00	0.17
<i>FCD</i>	5,232	0.61	0.00	1.00	1.00	0.49
<i>FCD_at</i>	4,516	0.05	0.00	0.01	0.06	0.08
<i>ln_Breadth</i>	3,660	2.44	1.79	2.64	3.26	1.08
<i>Depth</i>	3,666	-0.42	-0.57	-0.32	-0.22	0.27
<i>PSIndex</i>	3,211	0.51	0.30	0.51	0.75	0.34
<i>ROS</i>	6,674	0.12	0.06	0.10	0.15	0.08
<i>R&D</i>	6,674	0.04	0.00	0.02	0.06	0.04
<i>Ads</i>	6,674	0.01	0.00	0.00	0.01	0.03
<i>Intan</i>	6,674	0.19	0.04	0.14	0.30	0.17
<i>Cash</i>	6,674	0.11	0.04	0.09	0.16	0.09
<i>Debt</i>	6,674	0.14	0.00	0.11	0.23	0.14
<i>Asset (\$mil)</i>	6,674	7,624	573	1,814	5,880	23,472
<i>Abs_EXRE</i>	6,507	0.04	0.00	0.02	0.05	0.07
<i>Dom_Inc</i>	6,507	0.06	0.02	0.05	0.09	0.07
<i>For_Inc</i>	6,507	0.05	0.02	0.04	0.07	0.05
<i>Dividend</i>	6,507	0.65	0.00	1.00	1.00	0.48

Key variables are defined as follows: *FROS* is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the five-year period less 1/5 times the sum of U.S. statutory tax rates over the same period. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. *Abs_Delta_CTA* is the absolute change in the consolidated translation adjustment scaled by lagged assets. *RXStability* is the weighted average risk point for exchange rate stability. *PPP_RX* is the weighted average ratio of purchasing power parity conversion rate to the foreign exchange rate. *FCD* is an indicator variable taking the value of one if a firm has outstanding currency derivatives at year-end, and zero otherwise. *FCD_at* is the total notional value of currency derivatives scaled by total assets. *Breadth* is the number of distinct foreign countries where a firm has operations. *Depth* is -1 times the ratio of the number of foreign subsidiaries in the top two foreign countries to the total number of foreign subsidiaries. See Appendix for all variable definitions. Continuous variables are winsorized at the 1st and the 99th percentile except for *FTR*, which is restricted to [-1,0].

Chapter 4

RESULTS

4.1 FX exposure and tax-motivated outbound shifting (H1)

Table 2 presents the regression results from estimating Equation (1). In Column 1, I report the baseline result without introducing $Fsales\%$ and its interaction with FTR . The coefficient on FTR is negative and significant at the $p < 0.01$ level, consistent with U.S. MNCs shifting income out of the U.S. during the sample period. In Column 2, where $Fsales\%$ and $FTR * Fsales\%$ are included, the coefficient on FTR remains negative and significant at the $p < 0.01$ level, indicating outbound shifting activities for firms with an average exposure level. Consistent with H1, the coefficient on $FTR * Fsales\%$ (0.36) is positive and significant at the $p < 0.01$ level.¹⁵ The economic magnitude is fairly large; a ten percentage point decrease in FTR translates into \$33 million of additional income shifted out of the U.S. by less exposed firms relative to highly exposed firms (defined as an $Fsales\%$ in the 25th percentile versus 75th percentile)¹⁶

4.2 Cross-sectional test: functional currency designation (H2)

Table 3 presents the results of estimating Equation (2). Column 1 shows the result of estimating the effect of FX exposure on tax-motivated outbound shifting for firm-years with less translation adjustments ($Low_ΔCTA$ group), which indicate

¹⁵Results are qualitatively similar when measures of global footprint (e.g., tax haven status and foreign asset percentage) and financial constraint (e.g., junk bond rating, the Size-Age Index, and dividend payment status) are further included in the regression.

¹⁶For highly exposed firms ($Fsales\%$ in the 75th percentile), the coefficient on FTR is -0.119. For less exposed firms ($Fsales\%$ in the 25th percentile), the coefficient on FTR is -0.230. The difference between the two coefficients is 0.111. Therefore, for a ten percentage point decrease in FTR , the difference in foreign pre-tax income between a low- and high-exposure firm is roughly \$33 million ($0.111 * 10\% * \$2,996$ million of mean foreign sales).

relatively fewer foreign affiliates making operating, investing, and financial decisions in foreign currencies. The coefficient on $FTR * Fsales\%$ is 0.10 but insignificant. However, in Column 2, where the result for firm-years with larger translation adjustments is reported (*High_ΔCTA* group), the coefficient on $FTR * Fsales\%$ is 0.62 and significant at the $p < 0.01$ level. The difference between the two coefficients is 0.52, which is significant at the $p < 0.01$ level using seemingly unrelated estimations. Consistent with H2, the evidence in Table 3 suggests that the constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with relatively more foreign affiliates using foreign currencies as their functional currencies.

4.3 Cross-sectional test: currency risk (H3)

Table 4 presents the results of estimating Equation (3). In columns 1 and 2, I report results using *RXStability* as the measure for currency risk. In Column 1, where currency risk is low (*RXStability* > median), the coefficient on $FTR * Fsales\%$ is 0.10 but insignificant. In Column 2, where currency risk is high (*RXStability* < median), the coefficient on $FTR * Fsales\%$ is 0.54 and significant at the $p < 0.01$ level. The difference between the two coefficients (0.44) is significant at the $p < 0.05$ level using seemingly unrelated estimations. In columns 3 and 4, I repeat the same analysis but use *PPP_RX* as the currency risk measure. Again, the coefficient on $FTR * Fsales\%$ in Column 4 is greater than that in Column 3 (difference=0.89, $p < 0.05$). Overall, the findings reported in Table 4 support H3: the constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with foreign affiliates in countries with riskier local currencies.

4.4 Currency hedging and tax-motivated outbound shifting (H4)

Table 5 provides the results of estimating Equation (4) using financial hedging measures. Columns 1 and 2 report the results when *FCD* is used to proxy for financial hedging. The coefficient on *FTR * Hedge* is -0.19 for the low FX exposure group and -0.22 for the high FX exposure group, both of which are significant at the $p < 0.05$ level or better. These results indicate that having a hedging program is associated with more outbound shifting for both highly and less exposed firms. In columns 3 and 4, where *FCD_at* is used, the coefficient on *FTR * Hedge* is -3.99 for the low FX exposure group and -0.94 for the high FX exposure group, both of which are significant at the $p < 0.05$ level or better. These results suggest that more derivative usage is associated with greater outbound shifting by U.S. firms. It appears that financial hedging has a greater facilitating effect on outbound shifting for less exposed firms, likely due to the greater effectiveness of hedging when FX exposure is low. Overall, the results presented in Table 5 support H4, which predicts that firms with more extensive hedging tend to shift more income outbound for tax incentives.¹⁷

Table 6 outlines the results of estimating Equation (4) using the two measures of operational hedges – *ln_Breadth* and *Depth*. I first report the results for using *ln_Breadth* in columns 1 and 2. The coefficient on *FTR * Hedge* for the low FX exposure group has the expected negative sign but is insignificant. However, the coefficient on *FTR * Hedge* for the high FX exposure group is 0.04, which is significant at $p < 0.10$. These results suggest that only highly exposed U.S. MNCs

¹⁷I acknowledge the potential issue of reverse causality in testing Equation (4) (i.e., income shifting can cause firms to engage in more hedging); however, using operational hedges measured by the location of subsidiaries should alleviate this concern because foreign subsidiaries are a prerequisite for outbound shifting. The decision to engage in financial hedging may be endogenous and correlated with the decision to shift income for reasons other than FX exposure. Although I am unaware of any alternative explanations, I further control for common determinants of financial hedging in the regression as a robustness test (untabulated), such as interest coverage ratio, quick ratio, debt maturity, income tax credit, market-to-book ratio, the ratio of capital expenditures over sales, and dividend yield. The results remain unchanged.

utilize operational hedges to shift income offshore, potentially because operational hedges are more costly to implement and derivative hedges are sufficient to manage FX risk for less exposed firms (Treanor et al. [2013]).

Columns 3 and 4 in Table 6 present the results when using *Depth* as the operational hedging measure. Similar to the results in columns 1 and 2, I find that firms with high FX exposure use operational hedges to facilitate outbound shifting (significant coefficient on $FTR * Hedge$ in Column 4), whereas the outbound shifting intensity for the less exposed firms does not respond to operational hedges (insignificant coefficient on $FTR * Hedge$ in Column 3). Overall, the results in Table 6 are consistent with H4. However, it seems that only highly exposed U.S. MNCs utilize operational hedges to facilitate tax-motivated outbound shifting.

Table 2

FX Exposure and Tax-Motivated Outbound Shifting

Variable	Prediction	(1)	(2)
<i>FTR</i>	-	-0.19*** (-4.75)	-0.18*** (-4.84)
<i>Fsales%</i>			-0.11*** (-3.86)
<i>FTR*Fsales%</i> (β_3)	+		0.36*** (2.52)
<i>ROS</i>		0.75*** (10.18)	0.77*** (10.28)
<i>R&D</i>		-0.18 (-1.38)	-0.07 (-0.57)
<i>Ads</i>		-0.06 (-0.59)	-0.09 (-0.82)
<i>Intan</i>		0.04 (1.50)	0.03 (1.00)
<i>Cash</i>		0.07 (1.26)	0.11* (1.83)
<i>Debt</i>		0.00 (0.09)	0.00 (0.17)
<i>Size</i>		0.01*** (2.96)	0.01*** (3.61)
Observations		6,674	6,674
Adjusted R-squared		0.34	0.37
Year FE		Yes	Yes
Industry FE		Yes	Yes

This table examines the effect of FX exposure on tax-motivated outbound shifting. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = \beta_0 + \beta_1 FTR_{i,t} + \beta_2 Fsales\%_{i,t-4} + FTR * \beta_3 Fsales\% + \Sigma \beta_{4n} Controls_{i,t} + \Sigma \beta_{5k} IND_{i,t} + \Sigma \beta_{6t} YEAR_{i,t} + \varepsilon_{i,t}.$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Table 3

Cross-sectional Test: Functional Currency Designation

Variable	Prediction	(1)	(2)
		<i>Low_ΔCTA</i>	<i>High_ΔCTA</i>
<i>FTR</i>	-	-0.20*** (-4.41)	-0.19*** (-3.62)
<i>Fsales%</i>		-0.15*** (-4.39)	-0.08*** (-2.93)
<i>FTR*Fsales%</i> (β_3)	+	0.10 (0.62)	0.62*** (3.11)
Observations		3,181	3,181
Adjusted R-squared		0.37	0.46
Year FE		Yes	Yes
Industry FE		Yes	Yes
Controls		Yes	Yes
β_3 for <i>High_ΔCTA</i> > β_3 for <i>Low_ΔCTA</i>			0.52***
Chi-squared Statistics			7.23

This table examines the effect of FX exposure on tax-motivated outbound shifting for subsamples based on the extent of using foreign currencies as the functional currencies among foreign affiliates. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = Low_ΔCTA_{i,t-4} * (\beta_{L0} + \beta_{L1}FTR_{i,t} + \beta_{L2}Fsales\%_{i,t-4} + \beta_{L3}FTR * Fsales\% + \Sigma\beta_{L4n}Controls_{i,t}) + High_ΔCTA_{i,t-4} * (\beta_{H0} + \beta_{H1}FTR_{i,t} + \beta_{H2}Fsales\%_{i,t-4} + \beta_{H3}FTR * Fsales\% + \Sigma\beta_{H4n}Controls_{i,t}) + \Sigma\beta_{5k}IND_{i,t} + \Sigma\beta_{6t}YEAR_t + \varepsilon_{i,t}.$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *Low_ΔCTA* (*High_ΔCTA*) is an indicator variable taking the value of one if the absolute change in the consolidated translation adjustment (under equity) scaled by lagged assets is less (greater) than the median. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Table 4

Cross-sectional Test: Currency Risk

Variable	Currency Risk Measure = Prediction	Currency Stability (<i>RXStability</i>)		PPP to Exchange Rate (<i>PPP_RX</i>)	
		(1) <i>Low Risk</i>	(2) <i>High Risk</i>	(3) <i>Low Risk</i>	(4) <i>High Risk</i>
<i>FTR</i>	-	-0.21*** (-3.60)	-0.18*** (-4.22)	-0.17*** (-4.04)	-0.08 (-0.52)
<i>Fsales%</i>		-0.11*** (-3.34)	-0.09*** (-3.52)	-0.09*** (-3.83)	-0.17** (-2.21)
<i>FTR*Fsales%</i> (β_3)	+	0.10 (0.46)	0.54*** (2.81)	0.22* (1.45)	1.11** (2.01)
Observations		1,823	1,823	3,294	366
Adjusted R-squared		0.43	0.51	0.44	0.69
Year FE		Yes	Yes	Yes	Yes
Industry FE		Yes	Yes	Yes	Yes
Controls		Yes	Yes	Yes	Yes
β_3 for <i>High Risk</i> > β_3 for <i>Low Risk</i>			0.44**		0.89**
Chi-squared Statistics			2.79		3.00

This table examines the effect of FX exposure on tax-motivated outbound shifting for subsamples based on currency risk. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = Low_Risk_{i,t-4} * (\beta_{L0} + \beta_{L1}FTR_{i,t} + \beta_{L2}Fsales\%_{i,t-4} + \beta_{L3}FTR * Fsales\% + \Sigma\beta_{L4n}Controls_{i,t}) + High_Risk_{i,t-4} * (\beta_{H0} + \beta_{H1}FTR_{i,t} + \beta_{H2}Fsales\%_{i,t-4} + \beta_{H3}FTR * Fsales\% + \Sigma\beta_{H4n}Controls_{i,t}) + \Sigma\beta_{5k}IND_{i,t} + \Sigma\beta_{6t}YEAR_t + \varepsilon_{i,t}.$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *Low_Risk* (*High_Risk*) is an indicator variable taking the value of 1 if *RXStability* is above (below) the sample median or *PPP_RX* is below (above) the top decile, and 0 otherwise. Specifically, *RXStability* is the weighted average currency stability score, and *PPP_RX* is the weighted average ratio of purchasing power parity conversion rate to the foreign exchange rate. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Table 5

Currency Derivatives and Tax-Motivated Outbound Shifting

Hedge Measure =		Hedging Program (<i>FCD</i>)		Notional Amount (<i>FCD_at</i>)	
		(1)	(2)	(3)	(4)
		<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>
Variable	Prediction	<i>Exposure</i>	<i>Exposure</i>	<i>Exposure</i>	<i>Exposure</i>
<i>FTR</i>	-	-0.18*** (-2.64)	0.02 (0.58)	-0.38*** (-4.65)	-0.07** (-2.11)
<i>Hedge</i>		-0.01 (-0.64)	0.00 (0.07)	0.13 (1.62)	0.07 (1.47)
<i>FTR*Hedge</i> (δ_3)	-	-0.19** (-1.67)	-0.22*** (-3.79)	-3.99*** (-3.13)	-0.94** (-2.25)
Observations		2,616	2,616	2,258	2,258
Adjusted R-squared		0.36	0.53	0.38	0.53
Year FE		Yes	Yes	Yes	Yes
Industry FE		Yes	Yes	Yes	Yes
Controls		Yes	Yes	Yes	Yes

This table examines the association between currency derivatives and tax-motivated outbound shifting for subsamples based on the FX exposure level. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = Low_Exposure_{i,t-4} * (\delta_{L0} + \delta_{L1}FTR_{i,t} + \delta_{L2}Hedge_{i,t-4} + \delta_{L3}FTR * Hedge + \Sigma\delta_{L4n}Controls_{i,t}) + High_Exposure_{i,t-4} * (\delta_{H0} + \delta_{H1}FTR_{i,t} + \delta_{H2}Hedge_{i,t-4} + \delta_{H3}FTR * Hedge + \Sigma\delta_{H4n}Controls_{i,t}) + \Sigma\delta_{5k}IND_{i,t} + \Sigma\delta_{6t}YEAR_t + \epsilon_{i,t}.$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *Low_Exposure* (*High_Exposure*) is an indicator variable taking the value of 1 if the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period is below (above) the sample median, and 0 otherwise. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. For the purpose of this table, *Hedge* is one of two variables that measure financial hedging; *FCD* is an indicator variable taking the value of 1 if a firm has outstanding currency derivatives at year-end, and 0 otherwise; *FCD_at* is the notional value of a firm's currency derivatives scaled by total assets at year-end. Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Table 6

Operational Hedges and Tax-motivated Outbound Shifting

Variable	Hedge Measure = Prediction	Network Breadth (<i>ln_Breadth</i>)		Network Depth (<i>Depth</i>)	
		(1)	(2)	(3)	(4)
		<i>Low</i> <i>Exposure</i>	<i>High</i> <i>Exposure</i>	<i>Low</i> <i>Exposure</i>	<i>High</i> <i>Exposure</i>
<i>FTR</i>	-	-0.28*** (-3.65)	-0.12*** (-2.62)	-0.30*** (-3.97)	-0.11*** (-2.44)
<i>Hedge</i>		-0.02** (-2.15)	-0.00 (-0.97)	0.08** (2.24)	0.02 (1.31)
<i>FTR*Hedge</i> (δ_3)	-	-0.01 (-0.20)	-0.04* (-1.38)	-0.13 (-0.59)	-0.23** (-2.00)
Observations		1,830	1,830	1,870	1,796
Adjusted R-squared		0.43	0.55	0.43	0.57
Year FE		Yes	Yes	Yes	Yes
Industry FE		Yes	Yes	Yes	Yes
Controls		Yes	Yes	Yes	Yes

This table examines the association between operational hedges and tax-motivated outbound shifting for subsamples based on the FX exposure level. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = Low_Exposure_{i,t-4} * (\delta_{L0} + \delta_{L1}FTR_{i,t} + \delta_{L2}Hedge_{i,t-4} + \delta_{L3}FTR * Hedge + \Sigma\delta_{L4n}Controls_{i,t}) + High_Exposure_{i,t-4} * (\delta_{H0} + \delta_{H1}FTR_{i,t} + \delta_{H2}Hedge_{i,t-4} + \delta_{H3}FTR * Hedge + \Sigma\delta_{H4n}Controls_{i,t}) + \Sigma\delta_{5k}IND_{i,t} + \Sigma\delta_{6t}YEAR_t + \epsilon_{i,t}.$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *Low_Exposure* (*High_Exposure*) is an indicator variable taking the value of 1 if the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period is below (above) the sample median, and 0 otherwise. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. For the purpose of this table, *Hedge* is one of two variables that measure operational hedges; *ln_Breadth* is the natural log of the number of distinct foreign countries where a firm has operations; *Depth* is negative one times the ratio of the number of foreign subsidiaries in the top two foreign countries to the total number of foreign subsidiaries (larger values indicate low depth). Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Chapter 5

ADDITIONAL ANALYSES

5.1 Addressing a potential mechanical association issue

There is a possibility that the main finding is driven by a mechanical association in the empirical design since $FROS$ and $FTR * Fsales\%$ are calculated using common components – foreign sales and foreign pre-tax income. To rule out this possibility, I re-run Equation (1) using the potential inbound shifters sample. My expectation is that FX exposure should not constrain tax-motivated inbound shifting activities. If a mechanical association between $FROS$ and $FTR * Fsales\%$ exists, the coefficient on $FTR * Fsales\%$ for this sample will also be positive and significant, as observed in Table 2.

To conduct this test, I follow the same sample selection procedure as discussed in Section 3.2 except that I now focus on firm-years with an average foreign effective tax rate greater than the U.S. statutory tax rate ($0 < FTR \leq 1$). This sample contains 4,195 observations. The result of estimating Equation (1) using this sample is presented in Table 7. In Column 1, where I report the result for the baseline model, the coefficient on FTR is negative and significant at the $p < 0.01$ level, consistent with U.S. MNCs shifting income into the U.S. for tax incentives during the sample period. In Column 2, where I include $Fsales\%$ and its interaction with FTR , the coefficient on $FTR * Fsales\%$ is positive but statistically insignificant. Therefore, this result provides a reasonable assurance that my main finding (H1) is not driven by a mechanical association in the empirical design.

5.2 Addressing an alternative explanation – political stability

A larger exposure to foreign exchange rate changes may be driven by a larger extent of foreign operations in politically unstable jurisdictions. If this is the case, an alternative explanation for my main finding is that firms with more exposure to foreign political instability are less likely to shift income out of the U.S. due to fear of foreign capital controls or confiscation of foreign assets. To address this concern, I include a measure of political stability and interact this variable with *FTR* when testing Equation (1). While I continue to expect FX exposure to negatively affect tax-motivated outbound shifting, I predict that U.S. firms with foreign affiliates in more politically unstable locations are less likely to shift income offshore.

To construct the firm-level foreign political stability measure, I first merge the country political stability scores obtained from The Worldwide Governance Indicators database with the Exhibit 21 data.¹⁸ The scores are normalized and range from -2.5 to 2.5, with a higher value indicating a more politically stable environment. I then construct a firm-level continuous measure (*PSIndex*) by weighting the subsidiary-level political stability score using the ratio of the number of subsidiaries located in that jurisdiction to the total number of foreign subsidiaries. With *PSIndex*, I estimate the following regression:

$$\begin{aligned}
 FROS_{i,t} = & \beta_0 + \beta_1 FTR_{i,t} + \beta_2 Fsales\%_{i,t-4} + \beta_3 FTR * Fsales\% + \\
 & \beta_4 PSIndex_{i,t-4} + \beta_5 FTR * PSIndex + \Sigma \beta_{6n} Controls_{i,t} + \\
 & \Sigma \beta_{7k} IND_{i,t} + \Sigma \beta_{8t} YEAR_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{5}$$

¹⁸The Worldwide Governance Indicators data cover the period 1996–2017 with some gaps between years.

Column 1 of Table 8 reports the results of estimating the above equation when excluding $Fsales\%$ and its interaction with FTR . I demean both FTR and $PSIndex$ when interacting the two variables. The coefficient on $FTR * PSIndex$ is -0.16 and significant at the $p < 0.05$ level, consistent with the conjecture that U.S. firms with foreign operations in politically unstable countries tend to shift less income offshore for tax incentives. In Column 2, where both $Fsales\%$ and $FTR * Fsales\%$ are included, the coefficient on $FTR * Fsales\%$ is positive and significant at the $p < 0.05$ level, and the coefficient on $FTR * PSIndex$ remains negative and significant. Therefore, my main finding is not explained by the relation between the exposure to political instability and outbound shifting.

5.3 Outbound shifting and net FX exposure

In this section, I examine whether the exposure to currency risk is a nontax cost of outbound shifting from an ex-post perspective. The purpose of this examination is three-fold. First, it reinforces the main empirical design (Equation 1), which examines the issue from an ex-ante perspective. Second, it further mitigates the potential mechanical association problem discussed above because I measure net FX exposure using the estimated coefficients of a dollar index from stock return regressions (see below for details). Third, for the same reason that net FX exposure is estimated using stock return regressions as opposed to financial variables, this test further mitigates the possibility of alternative explanations for my main finding beyond the cross-sectional tests examined previously.

The rationale for this test is as follows. A tax planner must consider all costs in the tax planning process (Scholes, Wolfson, Erickson, Hanlon, Maydew, and Shevlin [2014]; Maydew [2001]). When the total costs of outbound shifting do not exceed the tax benefits, a rational firm will bear the costs and engage in outbound shifting.

Consequently, these costs will be incurred when a U.S. firm shifts income offshore for tax incentives. In other words, if outbound shifting is costly because it will expose shifted income to currency risk, more income shifting should lead to a larger net FX exposure. I investigate this prediction by testing whether a firm's outbound shifting intensity is positively associated with its net FX exposure.

To operationalize this test, I use a three-step framework. First, I obtain a firm's outbound shifting intensity by estimating and coding the $\hat{\beta}_2$ values as *Beta_FTR* for each potential outbound shifter firm using the following five-year rolling regressions ending in t:

$$FROS_t = \beta_0 + \beta_1 ROS_t + \beta_2 FTR_t + \varepsilon_t.$$

In the second step, I estimate a firm's net FX exposure using the following 60-month rolling regressions ending in month t of a fiscal year-end:

$$Ret_t = \alpha_0 + \alpha_1 Ret_{m,t} + \alpha_2 FXI_t + \nu_t$$

where:

- Ret_t = Return on common stock in period t;
- $Ret_{m,t}$ = Return on the value-weighted market portfolio in period t; and
- FXI_t = Return on a trade-weighted exchange rate index in period t. The real effective exchange rate indices are retrieved from the Bank for International Settlements.

This design is in the spirit of Adler and Dumas [1984], who define net exposure to exchange rate movement (α_2) as the change in the firm's market value resulting from a change in the exchange rate. It has been widely used in contemporary studies that investigate net FX exposure (Allayannis and Ofek [2001]; Jorion [1990]; Bodnar

and Wong [2003]; Bartram, Brown, and Minton [2010]).¹⁹ The absolute value of $\hat{\alpha}_2$, which I code as *Alpha_FXI*, captures the unsigned magnitude of a firm's net FX exposure in year *t*.

In the final step, I regress net FX exposure (*Alpha_FXI*) on the income shifting intensity (*Beta_FTR*) measure among the potential outbound shifters:

$$\begin{aligned} \text{Alpha_FXI}_{i,t} = & \lambda_0 + \lambda_1 \text{Beta_FTR}_{i,t} + \lambda_2 \text{Fsales\%}_{i,t} + \lambda_3 \text{FCD}_{i,t} + \lambda_4 \text{Size}_{i,t} + \\ & \Sigma \lambda_{5k} \text{IND}_{i,t} + \Sigma \lambda_{6t} \text{YEAR}_t + v_{i,t} \end{aligned} \quad (6)$$

Based on the prediction that tax-motivated outbound shifting increases net FX exposure, I expect the coefficient on *Beta_FTR* to be negative since a more negative *Beta_FTR* value indicates a larger outbound shifting intensity. In the above equation, I also include several control variables, such as the ex-ante FX exposure level, financial hedging status, firm size, and industry and year fixed effects. I expect the coefficient on *Fsales%* to be positive and the coefficient on *FCD* to be negative.

Table 9 presents the results of testing Equation (6). Since *Alpha_FXI* and *Beta_FTR* are estimated statistics, I use bootstrap standard errors clustered by firm for this test. Column 1 presents the result when using the narrow FX index returns in the net FX exposure estimation process.²⁰ Consistent with my prediction, the coefficient on *Beta_FTR* is negative and significant at the $p < 0.05$ level. Results for the control variables are in line with extant literature. In Column 2, where the broad FX index returns are used in the net FX exposure estimation process, again the

¹⁹The 60-month estimation period represents a common practice in the exchange rate exposure literature. Returns are calculated on a 60-month horizon because it matches the length of the multi-period design of the income shifting test and a longer return horizon typically increases the precision of net exposure estimates (Bodnar and Wong 2003).

²⁰The narrow (broad) index comprises 27 (61) economies with data from 1964 (1994). Both indices are based on a trade-weighted average of real effective bilateral exchange rates between the U.S. and its major trade partner countries. Visit <https://www.bis.org/statistics/eer.htm> for more information.

coefficient on *Beta_FTR* is negative and significant at the $p < 0.05$ level. In summary, the evidence presented in this table supports the prediction that tax-motivated outbound shifting increases a firm's net FX exposure, therefore lending support to my main finding.

5.4 FX exposure and foreign currency cash holdings

In this section, I verify the assumption that U.S. MNCs are concerned about potential depreciation of cash value caused by FX movements. If this assumption holds, I expect U.S. MNCs' cash holdings in foreign currencies to be non-trivial and increase in FX exposure. Because foreign currency cash holdings are unobservable, I use the amount of cash flows due to exchange rate changes reported in the consolidated statement of cash flows (*EXRE* in Compustat) as a proxy. I define the variable *Abs_EXRE* as the absolute value of cash flows due to FX effects divided by lagged cash value; this variable indicates the size of FX effect on cash relative to the previous year's cash value.

I first examine whether U.S. MNCs hold a non-trivial amount of cash in foreign currencies. Table 1 shows the summary statistics of *Abs_EXRE* for my main sample. The mean (median) *Abs_EXRE* is 4% (2%), indicating that the average (median) appreciated/depreciated cash value in the current year is 4% (2%) of the total cash value in the previous year. Although it is impossible to quantify the foreign currency cash base due to firms' heterogeneous currency exposures and the inter-temporal variation in exchange rates, these statistics nonetheless suggest that an average U.S. MNC has considerable foreign currency cash holdings.

To examine whether FX exposure is positively associated with foreign currency cash holdings, I estimate the following test:

$$Abs_EXRE_{i,t} = \theta_0 + \theta_1 Fsales\%_{i,t} + \theta_2 Dom_Inc_{i,t} + \theta_3 For_Inc_{i,t} + \Sigma\theta_{4n} Controls_{i,t} + \Sigma\theta_{5k} IND_{i,t} + \Sigma\theta_{6t} YEAR_{i,t} + \tau_{i,t} \quad (7)$$

where *Dom_Inc* is domestic pre-tax income scaled by lagged assets, *For_Inc* is foreign pre-tax income scaled by lagged assets, and *Controls* is a set of additional firm-level control variables measured in annual values, including R&D expenses, intangible assets, debt, firm size, and an indicator for dividend payments. I expect the coefficient on *Fsales%* (θ_1) to be positive.

Table 10 presents the findings for Equation (7) using the potential outbound shifter sample with non-missing values for all regression variables. The coefficient on *Fsales%* is 0.022 and significant at the $p < 0.01$ level, consistent with the prediction that a larger FX exposure is associated with more foreign currency cash holdings. In terms of economic magnitudes, the difference in the amount of the change in cash values due to exchange rate effects relative to the previous year's cash value between a less and highly exposed U.S. firm (defined as an *Fsales%* in the 25th percentile versus 75th percentile) is roughly 0.7 percentage point, or 17 percent of the mean *Abs_EXRE* value. The result in Table 10 also provides evidence that domestic income is generally not subject to currency risk (coefficient on *Dom_Inc* is insignificant), whereas more foreign income is associated with a larger translation effect on cash (significant and positive coefficient on *For_Inc*). Overall, the evidence from descriptive statistics and the empirical test support my assumption that U.S. MNCs are concerned about potential depreciation of cash value due to FX movements.

Table 7

FX Exposure and Tax-Motivated Inbound Shifting

Variable	Prediction	(1)	(2)
<i>FTR</i>	-	-0.10*** (-10.75)	-0.10*** (-11.55)
<i>Fsales%</i>			-0.05** (-3.45)
<i>FTR*Fsales%</i> (β_3)	?		0.02 (0.35)
Observations		4,195	4,195
Adjusted R-squared		0.40	0.41
Year FE		Yes	Yes
Industry FE		Yes	Yes
Controls		Yes	Yes

This table examines the effect of FX exposure on tax-motivated inbound shifting. The sample consists of firm-years with an average foreign effective tax rate greater than the U.S. statutory tax rate (i.e., potential inbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = \beta_0 + \beta_1 FTR_{i,t} + \beta_2 Fsales\%_{i,t-4} + \beta_3 FTR * Fsales\% + \Sigma \beta_{4n} Controls_{i,t} + \Sigma \beta_{5k} IND_{i,t} + \Sigma \beta_{6t} YEAR_{i,t} + \varepsilon_{i,t}$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Table 8

Robustness Test: Foreign Political Stability

Variable	Prediction	(1)	(2)
<i>FTR</i>	-	-0.24*** (-4.81)	-0.20*** (-4.46)
<i>Fsales%</i>			-0.12*** (-4.06)
<i>FTR*Fsales%</i> (β_3)	+		0.36** (1.79)
<i>PSIndex</i>		0.01 (0.60)	0.00 (0.03)
<i>FTR*PSIndex</i>	-	-0.16** (-1.92)	-0.17** (-1.86)
Observations		3,211	3,211
Adjusted R-squared		0.43	0.46
Year FE		Yes	Yes
Industry FE		Yes	Yes
Controls		Yes	Yes

This table examines the effect of FX exposure on tax-motivated outbound shifting while controlling for foreign political stability. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$FROS_{i,t} = \beta_0 + \beta_1 FTR_{i,t} + \beta_2 Fsales\%_{i,t-4} + \beta_3 FTR * Fsales\% + \beta_4 PSIndex_{i,t-4} + \beta_5 FTR * PSIndex + \sum \beta_{6n} Controls_{i,t} + \sum \beta_{7k} IND_{i,t} + \sum \beta_{8t} YEAR_{i,t} + \varepsilon_{i,t}.$$

FROS is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period. *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates over the same period. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. *PSIndex* is the weighted average foreign political stability score with a higher value indicating a more politically stable environment. Control variables include worldwide return on sales (*ROS*), R&D expenses (*R&D*), advertising expenses (*Ads*), intangible assets (*Intan*), cash (*Cash*), debt (*Debt*), and firm size (*Size*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Table 9

Tax-Motivated Outbound Shifting and Net FX Exposure

Variable	Prediction	Net FX Exposure Estimated using:	
		(1) Narrow Index	(2) Broad Index
<i>Beta_FTR</i> (λ_1)	-	-0.46** (-1.99)	-0.59** (-2.18)
<i>Fsales%</i>	+	1.59* (1.32)	2.89** (1.90)
<i>FCD</i>	-	-1.07** (-2.03)	-1.52** (-2.07)
<i>Size</i>		-0.26* (-1.74)	-0.40** (-2.25)
Observations		2,788	2,788
Adjusted R-squared		0.20	0.19
Year FE		Yes	Yes
Industry FE		Yes	Yes

This table examines the effect of tax-motivated outbound shifting on net FX exposure. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (z-statistics) from the following regression:

$$Alpha_FXI_{i,t} = \lambda_0 + \lambda_1 Beta_FTR_{i,t} + \lambda_2 Fsales\%_{i,t} + \lambda_3 FCD_{i,t} + \lambda_4 Size_{i,t} + \Sigma \lambda_{5k} IND_{i,t} + \Sigma \lambda_{6t} YEAR_t + v_{i,t}.$$

Alpha_FXI is the absolute value of $\hat{\alpha}_2$ from the firm-specific 60-month rolling regressions ending in month t of a fiscal year-end: $Ret_t = \alpha_0 + \alpha_1 Ret_{m,t} + \alpha_2 FXI_t + \nu_t$ where *Ret* is the 60-month common stock return, *Ret_m* is the 60-month value-weighted market return, and *FXI* is the 60-month return on a trade-weighted exchange rate index. *Beta_FTR* is the predicted $\hat{\beta}_2$ value from the firm-specific five-year rolling regressions ending in year t: $FROS_t = \beta_0 + \beta_1 ROS_t + \beta_2 FTR_t + \varepsilon_t$ where *FROS* is the sum of foreign pre-tax income over the five years from t-4 through t divided by the sum of foreign sales over the same period, *ROS* is the sum of total pre-tax income over the five years from t-4 through t divided by the sum of total sales over the same period, and *FTR* is the sum of total foreign taxes over the five years from t-4 through t divided by the sum of foreign pre-tax income over the same period less 1/5 times the sum of U.S. statutory tax rates. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. *FCD* is an indicator variable taking the value of 1 if a firm has outstanding currency derivatives at year-end, and 0 otherwise. *Size* is the natural log of (1+total assets in millions). All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Both regressions use bootstrap standard errors clustered by firm.

Table 10

FX Exposure and Exchange Rate Effect on Cash

Variable	Prediction	(1)
<i>Fsales%</i>	+	0.022*** (3.54)
<i>Dom_Inc</i>		-0.017 (-0.98)
<i>For_Inc</i>	+	0.043** (1.89)
<i>R&D</i>		-0.204*** (-6.61)
<i>Intan</i>		0.031*** (3.95)
<i>Debt</i>		0.036*** (4.11)
<i>Size</i>		-0.005*** (-4.93)
<i>Dividend</i>		0.005* (1.81)
Observations		6,507
Adjusted R-squared		0.12
Year FE		Yes
Industry FE		Yes

This table examines the association between FX exposure and the exchange rate effect on cash. The sample consists of firm-years with an average foreign effective tax rate less than the U.S. statutory tax rate (i.e., potential outbound shifters). I report coefficient estimates (t-statistics) from the following regression:

$$Abs_EXRE_{i,t} = \theta_0 + \theta_1 Fsales\%_{i,t} + \theta_2 Dom_Inc_{i,t} + \theta_3 For_Inc_{i,t} + \Sigma \theta_{4n} Controls_{i,t} + \Sigma \theta_{5k} IND_{i,t} + \Sigma \theta_{6t} YEAR_{i,t} + \tau_{i,t}.$$

Abs_EXRE is the absolute value of the exchange rate effect on cash scaled by lagged cash. *Fsales%* is the sum of foreign sales over the five years from t-4 through t divided by the sum of total sales over the same period. *Dom_Inc* is domestic pre-tax income scaled by lagged assets. *For_Inc* is foreign pre-tax income scaled by lagged assets. Control variables include R&D expenses (*R&D*), intangible assets (*Intan*), firm size (*Size*), and dividend (*Dividend*). *IND* and *YEAR* are industry and year indicators. All variables are defined in the Appendix.

***, **, * denote t-statistics (in parentheses) that are significant at 1%, 5%, and 10%, respectively, using a two-tailed (one-tailed) test for coefficients without (with) a prediction. Standard errors are clustered by firm.

Chapter 6

CONCLUSION

The purpose of this paper is to investigate whether the ex-ante exposure to FX risk affects tax-motivated outbound shifting by U.S. MNCs. Since outbound shifting would expose shifted income denominated in foreign currencies to FX risk, I hypothesize that U.S. MNCs with larger FX exposure shift less income out of the U.S. for tax incentives. Using U.S. MNCs' financial data from 1988–2016, the collective evidence presented in this study supports this prediction. My cross-sectional analyses demonstrate that the constraining effect of FX exposure on tax-motivated outbound shifting is greater for U.S. MNCs with more foreign affiliates using foreign currencies as their functional currencies or for those with affiliates in countries with riskier local currencies.

To explore whether U.S. MNCs can manage FX exposure as they shift income offshore, I investigate the relation between hedging and tax-motivated outbound shifting. Consistent with the prediction that currency hedging reduces the cost of FX exposure and thus increases the profitability of outbound shifting, I find that firms with a greater extent of financial or operational hedging activities shift more income offshore for tax incentives. In particular, while both less and highly exposed U.S. MNCs use currency derivatives to facilitate tax-motivated outbound shifting, it appears that only highly exposed U.S. MNCs use operational hedges to facilitate the tax planning strategy.

I contribute to the current income shifting literature by documenting FX exposure as a nontax cost to U.S. firms' outbound shifting activities. This finding expands our knowledge of the constraints of income shifting and explains the

heterogeneity in the extent of tax-motivated outbound shifting among U.S. MNCs. I also contribute to the derivative hedging literature by documenting a positive association between hedging and outbound shifting. This evidence broadens our understanding of the mechanism through which derivative contracts are used to facilitate tax avoidance by U.S. MNCs. Further, I contribute to the net exchange rate exposure literature by showing that tax-motivated outbound shifting is a determinant of a firm's net FX exposure. Lastly, this study provides another explanation for why firms under territorial tax systems tend to shift more income than those under worldwide tax systems. That is, due to the tax-free repatriation, a greater portion of shifted income by firms under territorial tax systems is not exposed to currency risk, therefore increasing the profitability of such tax planning activities.

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APPENDIX

Variable Definitions

Variable	Definition
<i>Main variables</i>	
<i>FROS</i>	Sum of foreign pre-tax income (t-4 to t) / sum of foreign sales (t-4 to t);
<i>FTR</i>	Sum of foreign taxes (t-4 to t) / sum of foreign pre-tax income (t-4 to t) - sum of U.S. statutory tax rates (t-4 to t) / 5;
<i>Fsales%</i>	Sum of total foreign sales (t-4 to t) / sum of total sales (t-4 to t);
<i>Abs_Delta_CTA</i>	Absolute change in the consolidated translation adjustment (equity) scaled by lagged assets;
<i>RXStability</i>	Weighted average risk point for exchange rate stability calculated over the five years from t-4 through t. A larger score indicates a more stable currency;
<i>PPP_RX</i>	Weighted average ratio of purchasing power parity conversion rate to foreign exchange rate over the five years from t-4 through t;
<i>FCD</i>	Indicator variable=1 if a firm has outstanding currency derivatives at year-end, and 0 otherwise;
<i>FCD_at</i>	Total notional value of currency derivatives over total assets;
<i>ln_Breadth</i>	Natural log of the number of distinct foreign countries where a firm has operations;
<i>Depth</i>	(-1) multiplied by the ratio of the number of foreign subsidiaries in the top two foreign countries to the total number of foreign subsidiaries;
<i>Control variables</i>	
<i>ROS</i>	Sum of total pre-tax income (t-4 to t) / sum of total sales (t-4 to t);
<i>R&D</i>	Sum of total R&D expenses (t-4 to t) / sum of total assets (t-4 to t);
<i>Ads</i>	Sum of total advertising expenses (t-4 to t) / sum of total assets (t-4 to t);
<i>Intan</i>	Sum of total intangible assets (t-4 to t) / sum of total assets (t-4 to t);
<i>Cash</i>	Sum of total cash (t-4 to t) / sum of total assets (t-4 to t);
<i>Debt</i>	Sum of total debt (t-4 to t) / sum of total assets (t-4 to t);
<i>Size</i>	Natural log of the average total assets (t-4 to t);

APPENDIX – Continued

Variable Definitions

Variable	Definition
<i>Variables in additional analyses</i>	
<i>PSIndex</i>	Weighted average foreign political stability score. A larger score indicates a more politically stable environment;
<i>Abs_EXRE</i>	Absolute value of the exchange rate effect on cash scaled by lagged cash;
<i>Dom_Inc</i>	Domestic pre-tax income scaled by lagged assets;
<i>For_Inc</i>	Foreign pre-tax income scaled by lagged assets;
<i>Dividend</i>	Indicator variable=1 if a firm pays dividends in year t, and 0 otherwise;
<i>Beta_FTR</i>	Predicted $\hat{\beta}_2$ value from the following firm-specific five-year rolling regressions ending in year t: $FROS_t = \beta_0 + \beta_1 ROS_t + \beta_2 FTR_t + \varepsilon_t$;
<i>Alpha_FXI</i>	Absolute value of $\hat{\alpha}_2$ estimated from the following firm-specific 60-month rolling regressions ending in month t of a fiscal year-end: $Ret_t = \alpha_0 + \alpha_1 Ret_{m,t} + \alpha_2 FXI_t + \nu_t$ where <i>Ret</i> is the 60-month cumulative return, <i>Ret_m</i> is the 60-month cumulative value-weighted market return, and <i>FXI</i> is the 60-month cumulative return on a trade-weighted exchange rate index.

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