Foreign Currency Adjustments in Executive Compensation

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Abstract

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This paper studies foreign currency adjustments in executive compensation (i.e. exclusion of foreign currency impacts from accounting-based performance metrics). In light of recent debates on the pros and cons of using non-GAAP adjustments in compensation, I propose a rational explanation for adjusting foreign currency concerning firm's operating decisions. I employ real options theory to study foreign currency fluctuations in decision making. I show, both analytically and empirically, that *Integration Level*, the extent of coordinated activities or cross-border transactions between the parent and its foreign subsidiaries, can serve as an explanation. Firms with a high level of integration are less likely to adopt foreign currency adjustments. On average, firms consider foreign currency fluctuations to make corporate decisions; the usage of foreign currency adjustments in executive compensation is less likely to be a result of managerial opportunism.

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Dedication

To my parents. To Ran.

Chapter 1: Introduction

Accounting-based performance metrics (e.g., net sales, operating income) are widely used in executive compensation contracts for both cash incentives and long-term equity awards [1, 2]. For stewardship purposes, these metrics often adopt adjustments to GAAP numbers to better align incentives and reflect managerial efforts.[1] Although it is theoretically sound to have performance metrics be different from reported GAAP numbers, in recent years, this practice has sparked discussions among investors and regulators as they argue that these adjustments simply boost C-suite compensation [3].[2] Common adjustments in executive compensation include acquisition and restructuring expenses, amortization expenses and impairments, changes in accounting standard and tax law, and foreign currency (FX). Foreign currency stands out due to its significance in modern globalization, unique features for accounting and economic decisions, complex nature, and limited attention from practice and academics [4]. This paper studies foreign currency adjustments in executive compensation (i.e., exclusion of foreign currency impacts from accounting-based performance metrics). I try to understand the rationale behind and the consequences of this adjustment.

Conventional wisdom offers explanations for both sides on whether to adopt foreign currency adjustments in executive compensation contracts. On the one hand, firms should include foreign currency impacts in compensation contracts because FX fluctuations affect firm's accounting performance, such as net income, which is what shareholders care about. On the other hand, firms should exclude foreign currency impacts because FX fluctuations are beyond manager's control and thus only add mean-zero noise to performance metrics. Some firms who adopt FX exclusion in their proxy statements discuss the underlying reasons as removing risk from executives.[3] Yet,

[1] For instance, capitalization of R&D expenses, which is not allowed under U.S. GAAP for reporting purposes, encourages managers to make investment decisions by avoiding upfront hit to performance metrics.

[2] See article: Pros and Cons of Using Non-GAAP Metrics for Executive Compensation, Including ESG Considerations.

[3] If firms do not have foreign currency adjustments, I don't observe them disclosing why they keep FX impacts in

both arguments are perhaps too simplistic because they ignore manager's response to FX fluctuations (i.e. incentive effect of FX fluctuations) and thus fail to appreciate when and how FX matters.

Foreign currency fluctuations affect firm's financial outcomes in two ways. First, the direct impacts come from mechanically accounting for foreign transactions or consolidating foreign subsidiaries through the translation and/or remeasurement process. For a U.S. firm who sells products in Europe, a strong dollar to euro negatively hits the firm's revenue in dollars. This direct accounting result is how people often think about the implications of FX fluctuations on firms. Second, the indirect impacts stem from operating decisions that incorporate FX movements, which in turn affect firm value and financial performance. These operating and investment decisions, for example, include where and when to invest, moving production overseas or not, and switching production locations among different foreign subsidiaries. I argue that the goal of compensation contracts on incentive alignment resides in motivating managers to take actions for value creation rather than focusing on short-term accounting outcomes.[4] Thus, to understand the rationale behind foreign currency adjustments, it is necessary to consider how FX fluctuations affect decision making.

Since managers cannot predict short-term FX fluctuations, operating and investment decisions are made with uncertain future outcomes. Real options are embedded in and add value to these decisions.[5] To make the most accurate decisions, the value of real options created by FX fluctuations must be included in the decision-making process.[6] It is important to point out that the option value is not affected if the firm hedges foreign currency risk by trading in forward or futures markets. Since such risk is fairly priced in efficient markets, any decrease in risk is offset by the decrease in return. A hedging transaction is a financial operation that doesn't change the firm's

performance metrics.

[4]This is consistent with the optimal contracting view, or shareholder value view [5] and firms' discussions in proxy statements.

[5]Real options allow a decision maker to choose the best alternative after new information becomes available. The existence of real options often requires three conditions: 1) future outcomes of operating and investment decisions are uncertain; and 2) the decisions are partially or completely irreversible; and 3) decision makers have discretion especially over the timing of the decisions [6].

[6]The idea of applying optionality to study FX related decisions is not new. For example, literature on management and operations has looked at multinationals' production location choices interacting with FX movements [7].

real decisions. In contrast, hedging techniques are often used to reduce the volatility of financial outcomes. Together, managing foreign currency risk via hedging is unlikely to be an explanation for excluding FX impacts from accounting-based performance metrics if incentive plans are set for long-term value creation.

I employ option pricing theory in a continuous-time framework to study FX fluctuations in decision making [6]. I use a typical investment problem as a representation of corporate decisions. I introduce two types of foreign subsidiaries – independent subsidiaries and dependent subsidiaries – and propose a related term, which is also the key element of the model, *Integration Level*. Independent subsidiaries are largely autonomous; they often make and sell in the same location under one currency. Dependent subsidiaries, on the other hand, tend to rely on the parent's operation for their revenue and/or expenses. The integration level refers to having coordinated activities in (or cross-border transactions between) entities that operate under different currencies. In other words, a firm has a high integration level if its foreign subsidiaries are mainly dependent subsidiaries. I propose that FX affects decision making for firms with a high integration level. The intuition is that the real option created by FX fluctuations has no value if foreign subsidiaries are independent. Independent foreign subsidiaries often don't have a mix of currencies for their revenue and expenses. If revenue and expenses are generated under one currency, FX simply serve as a multiplier to net income. Different foreign exchange rates only alter financial outcomes, but not corporate decisions such as when to invest in foreign subsidiaries. To the contrary, firms with a high integration level are more likely to have substantial transactions between the parent and foreign subsidiaries in multiple currencies. In this case, FX cannot be treated as a multiplier to the end result; FX fluctuations create valuable real options that affect decision making.

I further take the insights from the investment problem to an agency setting, where a manager is responsible for making the investment. Following a simple goal congruence argument, I find that FX fluctuations should be included in executive compensation to motivate correct decision making for firms with a high integration level. Together, the analytical model illustrates when and how FX affects firm's operating decisions and how accounting-based performance metrics, as a

function of FX, should be chosen optimally. Moreover, the model implication translates into my empirical hypothesis: firms with a high integration level are less likely to exclude FX impacts from compensation contracts.

I test the above hypothesis through a sample of U.S. multinationals for fiscal year 2007 to 2019. I search companies' annual proxy statements to obtain information on foreign currency adjustments (*Exclusion*). To proxy for firm's integration level, I compute intersegment revenue eliminations (*RevElimi*) from segment disclosures in the 10-Ks, the standard deviation of revenue to cost ratios (*sd_c_y, sd_c*) and revenue to fixed assets ratios (*sd_a_y, sd_a*) across locations with distinct currencies using BvD's Orbis database, and the number of business segments (*NBus*) from segment disclosures. Intersegment revenue elimination and number of business segments are indications of internal transfers and the standard deviation of revenue to cost (fixed assets) ratios across different locations with distinct currencies shows whether the parent firm and subsidiaries operate mostly in an autonomous way (i.e., make and sell in one location). I run liner probability models using each of the four proxies individually and collectively as interaction terms. Overall, empirical results are consistent with my model prediction and suggest that firms with a high integration level are less likely to adopt foreign currency adjustments. Further, I run two cross-sectional tests to examine the impacts of exchange rate volatility (*vol, vol_lag1*) and financial hedges (*Hedge*) on firm's decision to adopt foreign currency adjustments. I find that, conditional on having cross-border transactions/internal transfers, firms with higher exchange rate volatility and financial hedges are less likely to exclude foreign currency impacts from their compensation contracts. Lastly, I study switchers who adopt foreign currency adjustments for the first time in my sample period and the time trend of adoption by industry. In sum, empirical results provide evidence that my proposed *Integration Level* can be a rational explanation for the reasons to adopt foreign currency adjustments. On average, firm's practice of adjusting FX impacts from accounting-based performance metrics doesn't seem to be driven by managerial opportunism.

This paper contributes to the literature in several ways. First, it speaks to the literature on foreign currency via managerial perspectives. Previous accounting and finance studies on foreign

currency primarily focus on accounting treatments, valuation (foreign exposure and firm value), risk management, and foreign exchange market [8, 9, 10, 11, 12]. Managerial perspectives are rarely investigated and thus leave open questions such as how to factor FX fluctuations in compensation decisions and whether and how much managers should be responsible for FX movements. Although I do not attempt to address these unanswered questions, I take a small initial step to explore foreign currency adjustments in executive compensation. My findings suggest that companies take foreign currency fluctuations into consideration in compensation contract to encourage value creation activities. Second, it adds to the current and growing literature on non-GAAP usage for executive compensation. While the literature on non-GAAP reporting is fruitful, studies on non-GAAP adjustments in compensation are just emerging. These studies are mainly descriptive in nature and provide first evidence on the adjustments adopted in executive compensation and comparison with non-GAAP adjustments for reporting purpose [13, 14]. I take a different approach and focus on the overlooked foreign currency adjustments only. Third, it contributes to the executive compensation literature on pay for non-performance, or "pay for luck." Early empirical evidence suggests that executive pays are tied to uncontrollable components of performance, or "luck" [15, 16]. Although this phenomenon can be explained by executive rent extraction, it might also be a result of optimal contracting, motivating executives to respond to exogenous shocks [9, 17]. Using exchange rate as a measure of luck, I propose and show that *Integration Level*, the extent of coordinated activities or cross-border transactions between the parent and its foreign subsidiaries, can be an explanation for foreign currency adjustments in executive compensation.

The rest of the paper is organized as follows. Chapter 2 discusses the background and Chapter 3 describes the analytical model. Chapter 4 presents the empirical analyses and finally Chapter 5 provides concluding remarks.

Chapter 2: Background

2.1 Foreign Currency Adjustments in Executive Compensation

Foreign currency adjustments in executive compensation refers to the exclusion of foreign currency impacts from accounting-based performance metrics, often termed as “constant currency" or “currency neutral" by firms.[1] This is done through translating current period activities in local currency using a base year’s currency conversion rate (usually last period).[2] Therefore, the effects of FX fluctuations in the current period is eliminated and the performance outcomes are comparable to that of last period.[3] This adjustment is not identical to the non-GAAP adjustment of foreign currency in financial reporting, which often adds back foreign currency translation adjustments. Thus, non-GAAP numbers for financial reporting cannot be applied directly to compensation contract. Firms often keep a separate record of transactions and exchange rates, which makes it costly to some extent to adopt foreign currency adjustments for performance metrics.

Foreign currency adjustments is often specified in the pre-established definitions of performance metrics along with other non-GAAP adjustments (rather than post adjustments, which are more discretionary). I pay special attention to not include *ex post* adjustments of foreign currency impacts when I collect foreign currency adjustments from firms’ proxy statements. Further, it is unlikely to be reverted back once the adjustment is in place. Regarding the significance of this adjustment, using a sample of 30 firms who report foreign currency adjustments, the amount of this adjustment is roughly 1% of revenue and 12% of net income.

[1] See Appendix A for examples. Throughout the paper, foreign currency adjustments, foreign currency exclusion, excluding the impacts of FX, and adjusting FX impacts all mean the same.

[2] For multinationals with foreign subsidiaries, for consolidation purpose, if a subsidiary uses the local currency as the functional currency, its income statement is translated using the weighted-average exchange rate during the reporting period while its assets and liabilities are translated using the exchange rate in effect as of the end of the period.

[3] Although this practice affects both income statement accounts and other comprehensive income (OCI), OCI is not the interest of discussion as accounting-based performance metrics are not based on accounts in OCI.

Chapter 3: The Model

To develop my model, I employ option pricing theory in a continuous-time framework [6]. The model consists of two parts: a decision problem and a delegation problem. In the decision problem, I study the effects of foreign currency on firm's operating decisions, in particular, its investment or capital transfer decisions. The key element of this decision problem is the integration level between the parent firm and its foreign subsidiaries. Once I have established the optimal decision rules, in the delegation problem, I introduce a manager who is in charge of making the decision. I investigate the optimal performance metric with respect to the exchange rate that motivates the manager to make the right investment decisions.

I focus on an investment decision (i.e., an upfront cash outflow and a stream of cash inflows) to be a representative of firm's operating decisions. I do so because it is clear and visible in my setting when and how FX matters in decision making. The investment problem, although formulated as a net present value (NPV) calculation, can be thought of as any operating activities that involve cash flows between the parent firm and its foreign subsidiaries.[1] The integration level refers to having coordinated activities in (or cross-border transactions between) entities that operate under different currencies. As I will illustrate below, my current setup assumes that all revenue of the investment comes from one country (in foreign currency) while costs can be in different jurisdictions. This assumption can be extended naturally to accommodate other situations. For example, we can have all investment costs in one location while revenue is generated from different countries or even have both revenue and costs coming from multiple jurisdictions.

[1]The setting of investment problem is for illustration only. It helps with the development of *Integration Level*. My theoretical framework applies to any operating/investment decisions as long as there are cash flows between entities who operate under distinct currencies within a multinational. I do not attempt to study firm's investment decisions in my empirical analyses.

3.1 The Decision Problem

When investment opportunities arise in foreign subsidiaries, the parent firm decides when to invest in (transfer capital to) these subsidiaries. The parent firm evaluates the return on investment in its own currency; that is, it cares about the benefits and costs of the investment in domestic currency. Denote X as the foreign exchange rate. One unit of foreign currency equals X units of domestic currency.[2] Assume that X follows a geometric Brownian motion without drift:

$$dX = \sigma X dZ,$$

where σ is the exchange rate volatility and Z is a Wiener process.[3] Denote r as the domestic interest rate and C as the constant cash flow each period from the investment in foreign currency. The investment takes on a simple form of perpetuity.[4] The costs of the investment can be in foreign currency entirely, or a mix of domestic and foreign currency, depending on the nature of investment opportunities. Denote i and I_1 as the investment cost in foreign and domestic currency, respectively. Without loss of generality, I normalize both costs to 1. I introduce two scenarios – independent subsidiary and dependent subsidiary – in my subsequent analyses to account for different possibilities of investment costs.

3.1.1 Scenario I: Independent Subsidiary

Independent subsidiaries are foreign subsidiaries who operate on their own. Their revenue and expenses are largely independent of the parent's operation. For example, T-Mobile US, whose parent company is Deutsche Telekom AG, operates fairly independently in the U.S..[5] Under this

[2] I use "foreign" and "local" interchangeably to represent the foreign subsidiaries. "Domestic" and "home" are used together to represent the parent firm.

[3] I do not include a drift term because the exchange rate in short periods (e.g., a year) is unlikely to exhibit any trends. Since the exchange rate cannot be negative, I use geometric Brownian motion (GBM) which is bounded by zero. GBM is chosen without loss of generality.

[4] The choice of perpetuity is chosen without loss of generality. The calculations and conclusions stay the same with other forms of cash flow streams.

[5] Other examples include firms who produce nondurable consumer goods and firms who are in the entertainment industry, such as hotels and theaters.

scenario, the investment cost of an investment opportunity in the foreign subsidiary is in its local currency and needs to be translated to home currency for the parent to evaluate the investment. Denote $F(X)$ as the present value of the investment opportunities. It represents the benefits from the investment when the investment is taken and the option value when the investment is not taken. Define T as a future unknown time when the investment is made (capital is transferred). Since the investment opportunity is a perpetuity, the present value of cash inflows from the investment is simply $\frac{C}{r}$. Thus, the net present value (NPV) of this investment in foreign currency is $\frac{C}{r} - 1$.[6] The parent firm applies the exchange rate at the time when the investment is made, X_T, to evaluate the investment opportunity in home currency. In the case of waiting and investing at a later date, the parent firm has to discount the NPV of the investment to account for the opportunity costs of waiting. Together, the parent's investment problem is given by

$$F(X) = \max \quad E[X_T(\frac{C}{r} - 1)e^{-rT}].$$

Lemma 1 *The parent firm's optimal investment threshold is* $X_T = 0$.

Since the same exchange rate applies to revenue and costs equally, there is no value in waiting for a favorable rate (waiting is costly). The parent firm should take the investment now if it has a positive NPV to avoid giving up the cash flow streams. Thus, under the scenario of independent subsidiary, where the parent and its foreign subsidiaries do not engage in coordinated activities to complete the investment, the foreign exchange rate does not affect the parent's investment decisions in a significant manner; the parent will not alter investment decisions to take into account the effects of FX.

[6]The investment cost in foreign currency, i, is normalized to 1, without loss of generality.

3.1.2 Scenario II: Dependent Subsidiary

Dependent subsidiaries are foreign subsidiaries who operate collaboratively with the parent company. Their revenue and/or expenses are dependent on the parent's operation. The auto industry serves as a good example. Many auto components, likely from suppliers/subsidiaries in different countries, are assembled to make a final product. Under this scenario, implementation of the new investment requires collaboration between the parent firm and the foreign subsidiary. Hence, the investment cost involves a mix of domestic and foreign currency. Denote I as the total investment cost in domestic currency. i and I_1 are the investment costs in foreign and domestic currency, respectively. I further normalize both costs to 1. Denote θ as the fraction of domestic investment cost to total investment cost. Thus, the total investment cost in domestic currency is the following:

$$I = \theta I_1 + (1-\theta) iX = \theta + (1-\theta)X.$$

When $\theta = 0$, this is equivalent to Scenario I. As in Scenario I, $F(X)$ represents the value of the investment opportunity and T is a future unknown time when the investment is made. The parent's investment problem now becomes:

$$F(X) = \max \quad E[(\frac{C}{r}X_T - \theta - (1-\theta)X_T)e^{-rT}].$$

Lemma 2 *The parent firm's optimal investment threshold is* $X_T = \frac{(\frac{\beta}{\beta-1})\theta}{\frac{C}{r}-(1-\theta)}$ *and is increasing in* θ.[7]

The higher the θ, the more investment costs happen at home. That is, the investment costs are less affected by the exchange rate. Because the exchange rate applies to the entire revenue but only to a portion of the costs, the parent firm would like to wait for a favorable rate to maximize the cash inflows. Thus, under the scenario of dependent subsidiary, where the parent and its foreign subsidiaries engage in coordinated activities to complete the investment, foreign exchange rate

[7] See Appendix C for proofs.

affects the parent's investment decisions.

3.2 The Delegation Problem

Now, I bring in a manager and let the parent firm delegate the investment decision specified in Section 3.1 to the manager. The parent firm, who is the principal in this agency setting, finds the appropriate performance metrics and designs the compensation contract to motivate the manager to make the right investment decisions. It follows a simple goal congruence argument.

The manager in place is interested in maximizing the present value of his compensation, W, while the parent firm's objective function is to maximize the NPV from the investment. In order to let the manager make the right investment decisions on behalf of the parent firm as specified in the decision problem, the parent firm has to align the goals of the manager and the firm through setting appropriate performance metrics for his compensation. The manager's compensation W is a function of the exchange rate, X, since W is contractible only on observables. Without loss of generality, let the exchange rate used in the performance metrics be two types: a fixed FX and a variable FX. With a commonly known fixed exchange rate (e.g., the weighted-average daily exchange rate of last year) in W, the manager is no longer making decisions under foreign currency fluctuations (i.e., uncertainty) whereas the parent firm is still facing the exchange rate movements. Hence, the goals of the manager and the firm do not align and the manager will make suboptimal decisions in the eyes of the firm.

Under the scenario of independent subsidiary, where the parent and its foreign subsidiaries engage in little to no cross-border transactions, the foreign exchange rate does not affect the parent's investment decisions in a significant manner. The manager will take the investment opportunity if its NPV is positive regardless whether he is evaluated based on a fixed exchange rate or a variable exchange rate. Under the scenario of dependent subsidiary, where the parent and its foreign subsidiaries engage in substantial amount of collaborations and transfers, the foreign exchange rate affects the parent's investment decisions. If the manager is compensated based on a fixed exchange rate, he will invest at a time to maximize his compensation, which is suboptimal for the firm. With

dependent subsidiaries, only a variable exchange rate in the compensation contract will motivate the manager to incorporate foreign currency fluctuations into consideration and to make the investment decisions in the interests of the firm. In short, the delegation problem, consistent with the insights from the decision problem, suggests that foreign currency fluctuations should be included in executive compensation for firms with a high integration level. This model implication translates into my empirical hypothesis: firms with a high level of integration are less likely to exclude foreign currency impacts from accounting-based performance metrics in compensation contracts.

Chapter 4: Empirical Analyses

4.1 Data and Sample

My sample contains U.S. multinationals for fiscal year 2007 to 2019. U.S. multinationals are defined as U.S. incorporated corporations with foreign subsidiaries. I focus on these firms, instead of all U.S. companies with foreign transactions, because multinationals can influence foreign subsidiaries' operations, which makes FX consideration more significant in decision making, and can further enjoy operation flexibility within and across subsidiaries, thereby creating optionality. My sample period starts from fiscal year 2007, following the SEC mandated disclosures of Compensation Discussion and Analysis section in companies' annual proxy statements, where I obtain information regarding foreign currency adjustments.[1] I stop at fiscal year 2019 to avoid the effect of COVID-19 on executive compensation.[2]

I begin with the entire Compustat database for fiscal year 2007 to 2019. I search for variables indicating foreign activities.[3] I retain U.S. incorporated corporations and remove financial institutions. Further, firms without foreign subsidiaries are excluded. These firms are identified as having no currency translation adjustments (*CICURR*) and foreign exchange income/loss (*FCA*) and cumulative translation adjustments (*RECTA*) in all years. The remaining firms are then merged with Execucomp, which covers S&P 1500 firms.[4] The full sample includes 1,556 unique firms and

[1] SEC mandated changes to disclosure requirements concerning executive compensation and related matters were first adopted by firms with fiscal years ending on or after December 15th, 2006.

[2] Some firms have adopted new adjustments, changed performance metrics, or exercised board discretion to adjust predetermined performance metrics in response to the pandemic. See article: Executive Pay Growth During the Pandemic Faces Scrutiny.

[3] Theses variables include Native currency code (CURNCD), Currency translation rate (CURRTR), Contingent liabilities-foreign exchange commitments (CLFX), Exchange adjustments-assets(EA), Exchange adjustments-liabilities (EXCADJ), Foreign exchange income/loss (FCA), Pretax income foreign (PIFO), Cumulative translation adjustment-retained earnings (RECTA), Currency translation adjustment-comprehensive income (CICURR), Cumulative translation adjustment-equity reserve (TRANSA), Income taxes-foreign (TXFO), and Deferred taxes-foreign (TXDFO).

[4] Merging with Execucomp makes the inclusion and exclusion samples more balanced over covariates.

15,951 firm-year observations. Finally, the sample is merged with BvD's Orbis database, where subsidiaries' financial information are provided. Table 1 summarizes the sample selection process.

Next, I search keywords related to foreign currency adjustments in firms' proxy statements for the entire EDGAR database to identify whether they choose to exclude FX impacts from accounting-based performance metrics. The list of keywords includes "constant currency," "currency neutral," and different combinations of "exclude" and "adjust" together with "currency" and "foreign exchange" within 10 words.[5] Firms who have these keywords in their proxy statements are coded as 1 (indicator variable *Exclusion*), suggesting that they adopt foreign currency adjustments. All other firms are coded as 0.[6] The exclusion subsample has 389 unique firms and the inclusion subsample contains 1,167 unique firms.

4.2 Measurement

As previously defined, a firm's integration level refers to having coordinated activities in (or cross-border transactions between) entities that operate under different currencies. A good proxy for the integration level thus needs to capture two aspects: transactions between the parent firm and its subsidiaries (and/or just between subsidiaries) as well as distinct currencies. I calculate four proxies for firm's integration level: intersegment revenue eliminations from segment disclosures in the 10-Ks, the standard deviation of revenue to cost ratios and revenue to fixed assets ratios across locations with distinct currencies using Orbis, and the number of business segments in segment disclosures. Each measure has its own merits and drawbacks.

Intersegment Revenue Eliminations: Intercompany transactions between different entities are eliminated in the process of consolidation. The level of intersegment revenue eliminations thus suggests the amount of activities between the parent firm and its subsidiaries (as well as between subsidiaries). Although this metric doesn't specify how much eliminations are related to foreign

[5] I verify that my keywords list is comprehensive and that the choice of 10 words is reasonable by varying the search terms and checking searched results.

[6] In general, companies don't mention foreign currency in a way suggested by my keywords list if they have no foreign currency adjustments. I randomly choose some firms coded as 0 and further verify that they indeed do not exclude FX impacts.

subsidiaries, it is still a good indicator for the level of internal transfer.[7] Large intersegment revenue eliminations suggest substantial transactions between the parent firm and its subsidiaries (as well as between subsidiaries); therefore, these firms are considered as having high integration level and should be less likely to adopt foreign currency adjustments. I calculate *RevElimi* as the percentage of reported intersegment revenue eliminations to total revenue each year.[8] Roughly 25% of the sample has a nonzero or non-missing intersegment revenue eliminations.

Standard Deviation of Revenue to Cost (Fixed Assets) Ratios: These two measures try to get a sense of whether parent firms and their foreign subsidiaries are operating in an autonomous or integrated fashion. For autonomous or independent structure, the parent firm and its subsidiaries tend to make and sell in their corresponding locations, matching revenue and costs as well as revenue and fixed assets in each location. Consequently, the revenue to cost ratios and revenue to fixed assets ratios across locations should be more similar, resulting in a low standard deviation of these ratios. On the other hand, for integrated or dependent structure, the parent firm and its subsidiaries tend to have production and sale strategies that misalign revenue and costs as well as revenue and fixed assets in each location. For example, the parent firm could be responsible for all the production (cost center) while the subsidiaries sell to different locations (distribution center). Thus, the revenue to cost ratios and revenue to fixed assets ratios across locations should be more diverse, leading to a high standard deviation of these ratios. In sum, firms with a high standard deviation for revenue to cost ratios and revenue to fixed assets ratios across locations with distinct currencies are considered as having a high integration level and should be less likely to adopt foreign currency adjustments.

To calculate revenue to cost (fixed assets) ratios in each location, I rely on BvD's Orbis database to obtain detailed financial information for subsidiaries. I first identify a list of subsidiaries for each

[7]Firms report intersegment revenue eliminations mostly under business segments, not geographic segments. Further, even if eliminations information by geographic segments is available, given the coarse geographic classifications reported by the firms (e.g., companies generally group countries by regions such as North America, Asian Pacific, Europe, etc.), it's less clear whether the reported eliminations are from transactions with different currencies.

[8]Total revenue is based on the aggregated revenue for all business segments or geographic segments, as provided in firm's segment disclosure. Revenue in the income statement is the net revenue (total revenue - intersegment revenue eliminations).

firm in my sample. These subsidiaries are level 1 subsidiaries (directly owned by the parent) and corporations only.[9] Compare to Exhibit 21 of 10-Ks, where firms are required to report significant subsidiaries, the subsidiaries lists from Orbis is more comprehensive. Next, I obtain necessary annual financial information for these subsidiaries. It turns out that only about 10% of the previously identified subsidiaries have financial information populated. This low sample size is a combination of three reasons: 1) financial information is not available for private companies in regions such as the U.S. since they are not required to report financial statements; and 2) firms on paper have many subsidiaries while in practice don't have any operation there; and 3) Orbis fails to collect financial information for some subsidiaries.[10] To verify that the populated subsidiaries with financial information is valid in order to continue my analyses, I compute aggregate revenue of all non-U.S. subsidiaries in U.S. dollars from Orbis and compare it to non-U.S. revenue reported in the segment disclosure. As expected, the Orbis revenue is smaller but only in higher deciles and the difference although statistically significant is not sizeable. Overall, the list of subsidiaries with financial information from Orbis is a fair representation of the complete list of subsidiaries.

I calculate the standard deviation of revenue to cost ratios and revenue to fixed assets ratios using two approaches.[11] The first approach produces a yearly standard deviation of these ratios for each firm (*sd_c_y, sd_a_y*). For each year, I aggregate revenue, cost of goods sold, and fixed assets for all subsidiaries in one currency. There is a difference between aggregating across locations and across currencies since several locations can use the same currency (e.g., euro zone). I further add in the U.S. parent firm's revenue, cost of goods sold, and long lived assets using segment disclosure.[12] I next compute the revenue to cost ratios and revenue to fixed assets ratios for each currency. Finally, I calculate the standard deviation of these ratios.[13] The advantage of this

[9]Other types of subsidiaries include financial company, mutual and pension fund, research institutue, insurance company, etc.

[10]Subsidiaries in the U.S. and Canada have the lowest numbers of populated financial information.

[11]The standard deviation of revenue to cost ratios and revenue to fixed assets ratios are further standardized by subtracting its sample mean and divided by its sample standard deviation.

[12]Since the financial information for the parent firm, as a standalone company, is not available, I use the revenue, cost of goods sold, and long lived assets for U.S. region in the segment disclosure as an alternative.

[13]The calculation of standard deviation requires at least two data points, that is, the subsidiaries need to reside in at least one currency region that is different from their U.S. parent.

approach is that a yearly standard deviation matches with other yearly variables and allows additional analyses such as examining time trend and changes. The disadvantage, however, is that the yearly standard deviations might vary greatly from year to year due to data limitation in Orbis.[14] The second approach creates only one standard deviation of revenue to cost ratios and revenue to fixed assets ratios for each firm (*sd_c, sd_a*). The process is identical to the first approach, except that I aggregate subsidiaries' (as well as the parent firm's) revenue, cost of goods sold, and fixed assets (long lived assets) in one currency for all available years. This approach utilizes all available data, partially mitigating the variations in standard deviations from year to year and increasing the sample size. The downside is that this variable stays the same for my sample period while other variables are annual-based. I perform the analyses using the standard deviation of revenue to cost (fixed assets) ratios from both approaches and the results are similar. I present the results from the first approach in the main text and the second approach in Appendix E.

Number of Business Segments: Number of business segments is often used to measure the complexity of a firm's operation. A complex corporation is more likely to have multiple entities involved in production and distribution, increasing the chances of engaging internal transfers. Moreover, the business segments can also be organized along the value chain, making one segment a supplier to the other segment. Thus, this measure in part suggests intercompany transactions; firms with a large number of business segments are considered as having a high integration level and should be less likely to adopt foreign currency adjustments. In addition, as previously discussed, firms report intersegment revenue eliminations mostly under business segments. Therefore, a large number of business segments is more likely to indicate a higher intersegment revenue eliminations. Lastly, I choose the number of business segments instead of geographic segments to proxy for firm's integration level because 1) firms report coarse geographic classifications similarly, likely resulting in a lack of variations across firms; 2) the number of geographic segments might not suggest internal transfer; and 3) better measures of distinct currencies are available given subsidiaries'

[14]Firms could open new subsidiaries or close existing ones that leads to changes of subsidiaries numbers and locations year by year. However, it creates measurement errors if the changes in subsidiaries numbers and locations from year to year is caused by Orbis' data limitation (i.e., failing to collect financial information for some subsidiaries in one year while those subsidiaries do exist in that year).

information from Orbis.

Comparisons: I access the merits and drawbacks of the above fours measures from two aspects: whether the measure captures transactions between the parent firm and its subsidiaries (as well as between subsidiaries) and whether the measure captures distinct currencies. A good proxy for the integration level needs to include both aspects. For intersegment revenue eliminations (*RevElimi*), it clearly captures internal transfers between the parent firm and its subsidiaries as well as between subsidiaries, however, it is less clear whether these transfers are across distinct currencies. The data sources are considered reliable (reported by public companies under SEC disclosure requirements) but the sample size is limited. For number of business segments (*NBus*), this measure is the least precise among the four. It indicates internal transfer to some extent, but once again, it is less clear how much does this measure speak to distinct currencies. The data sources are also reliable and the number of observations available is the highest among the four measures. For standard deviation of revenue to cost ratios (*sd_c_y, sd_c*) and revenue to fixed assets ratios (*sd_a_y, sd_a*), these two sets of measures are better than intersegment revenue eliminations and number of business segments as they combine internal transfer and distinct currencies together. However, the major drawback is that the data validity is relatively low as Orbis suffers from data limitation and the standard deviation calculation further reduces sample sizes. Between the two ratios, although the revenue to cost ratio is more intuitive, the revenue to fixed assets ratio is actually finer. For one thing, there are more data points available for fixed assets than for cost of goods sold. Further, revenue to cost ratios are more likely to be distorted by negotiated transfer prices between the parent firm and its subsidiaries as well as between subsidiaries.[15] In sum, all four measures suffer from some technical issues and data limitations yet they are the best proxies available for now. I run my empirical analyses using each proxy individually and also collectively with interaction terms.

Other Variables: Other variables apart from the dependent variable and the independent vari-

[15] Since the revenue and cost of goods sold data are at the subsidiaries' level, the revenues and costs would include transfer prices if there are internal transfers between subsidiaries. The transfer prices serve as one party's revenues and another party's costs. Therefore, the standard deviations of revenue to cost ratios might be more similar especially with negotiated transfer pricing. A low standard deviation of revenue to cost ratios might not correspond to low level of internal transfer.

able of interests are explained here. *Size* and *ROA* control for size and profitability. *CICURR* and *RECTA* are currency translation adjustments, which can also indicate foreign currency exposure. *ForSales* is the percentage of foreign sales; it shows how much foreign operations there are and is a more direct measure of foreign currency exposure. *EquityPay* is equity compensation divided by total pay using Execucomp for CEO only. Compare with bonus pay, equity compensation (stock awards and options) is less affected by FX adjustment since the use of accounting-based performance metrics is limited. *Hedge* indicates the utilization of financial derivatives to manage foreign currency risk. The percentage of foreign subsidiaries out of total subsidiaries (*ForSub*) and the number of foreign countries/regions where subsidiaries are located (*ForCountry*) suggest operational dispersion. Firms could use operational hedges to manage foreign currency risk, such as spreading foreign operations among multiple currency regions. I further have numbers of currencies used to calculate standard deviations of revenue to cost ratios (*n_c_y, n_c*) and revenue to fixed assets ratios (*n_a_y, n_a*). *OrbisRev* tries to access how much total revenue can be explained by revenue from subsidiaries. *NGeo* is the number of geographic segments as reported by firms in their segment disclosures. Finally, I calculate a weighted-average yearly exchange rate volatility faced by each firm (*vol, vol_lag1*). Daily exchange rate data is obtained from Federal Reserve Economic Data (FRED).[16] I use the exchange rates of nine most common currency regions for subsidiaries: Canadian Dollar (CAD), British Pound (GBP), Chinese Yuan (CNY), Euro (EUR), Mexican Peso (MXN), Australian Dollar (AUD), Hong Kong Dollar (HKD), Indian Rupee (INR), and Japanese Yen (JPY). One unit of foreign currency equals exchange rate units of U.S. Dollars. For every currency in each year, I compute the volatility of exchange rates as coefficients of variation (i.e. standard deviation divided by mean). Next, I calculate the weights of each currency as the revenue in that currency divided by total subsidiaries' revenue, both converted to U.S. dollar using year end exchange rate. Lastly, the weighted-average yearly exchange rate volatility for each firm is the sum of weights multiply by the volatility of corresponding currencies. I further calculate *vol_lag1* using the current year's weights but last year's volatility of exchange rates.

[16]FRED.

4.3 Summary Statistics

Figure 1 plots the volatility of daily exchange rates, as measured by the coefficient of variation, for five major currencies relevant to U.S. parent firms for my sample period 2007 to 2019. The five currencies are Euro (EUR), British Pound (GBP), Chinese Yuan (CNY), Mexican Peso (MXN), and Japanese Yen (JPY). One unit of foreign currency equals exchange rate units of U.S. Dollars. It suggests that exchange rate volatilities can be significant and therefore could potentially alter financial outcomes and operational decisions in a substantial way. Figure 2 shows the number of firms each year in my sample and the number of firms who adopt foreign currency adjustments (*Exclusion=1*). The declining trend of the number of firms over years is consistent with the overall decrease of U.S. public companies post year 2000. The number of firms who adjust foreign currency impacts, however, has gradually increased and becomes relatively stable since 2015. This increasing trend also corresponds to the current ongoing movement of using non-GAAP metrics for compensation.

Table 1 describes the sample selection process for fiscal year 2007 to 2019. The full sample has 1,556 unique U.S. multinational firms and 15,951 firm-years. The full sample is further divided into the exclusion subsample (*Exclusion=1*) and the inclusion subsample (*Exclusion=0*) based on whether firms adjust foreign currency impacts from their accounting-based performance metrics. Table 2 displays the industry distribution of the exclusion subsample. Industry is based on Fama and French 12-Industry Classification. For each industry, I document the total number of firm-years, the number of firm-years where foreign currency adjustments is adopted, and their corresponding percentage. The industry distribution of the exclusion subsample is largely consistent with my proposed integration level argument. For instance, firms who produce consumer durables are more likely to have complex supply chain and to engage in internal transfer across currencies than those who produce consumer non-durables. They should have a higher integration level and thus are less likely to adopt foreign currency adjustments. The exclusion percentage of 23.8% for the non-durables industry and 14.4% for the durables industry support this explanation.

With the same logic, the relatively low percentages of the manufacturing industry and the business equipment industry are reasonable since firms in these industries are likely having a high integration level. For the oil and gas as well as the utilities industry, the very few number of exclusion is mostly because the U.S. dollar is the dominating currency for transactions in these industries. The chemicals and health-care industry show higher exclusion percentages probably because these firms tend to have higher proprietary costs and prefer to keep productions in the United States. Overall, industries whose firms are likely to be considered as having a high integration level based on their business model and characteristics exhibit lower percentages of adopting foreign currency adjustments. Table 3 shows the sample distribution of subsidiaries from the Orbis database. Panel A lists the top 10 regions where subsidiaries are located. The U.S. multinationals in my sample have substantially more domestic subsidiaries than foreign ones. However, when search for these subsidiaries' annual financial information for my sample period, U.S. and Canada are no longer in the top 10 regions where subsidiaries are located. Panel B1 lists the new order based on the number of firm-years for subsidiaries with financial information. Panel B2 exhibits the count distribution by year. The trend is almost in a perfect descending order, where early years have lower number of subsidiaries with financial information while later years have significantly higher number of observations. It suggests that Orbis may suffer from data collection limitation especially in early years.

Table 4 provides descriptive statistics for the exclusion and inclusion subsamples.[17] Firms that adopt foreign currency adjustments are larger in size and more profitable than firms who do not exclude FX impacts. These firms also exhibit greater foreign currency exposure (foreign operation level), as measured by the percentage of foreign sales (*ForSales*). Consistently, they have larger currency translation adjustments (*CICURR*) and cumulative translation adjustments (*RECTA*). Moreover, these firms face slightly higher exchange rate volatility (*vol, vol_lag1*) and are more likely to use financial hedges (*Hedge*) to manage currency risk. Overall, these results are intuitive since large multinationals with a great emphasis on foreign operations care about foreign

[17] All continuous variables are winsorized at their 1st and 99th percentiles.

currency impacts and have the ability to adopt foreign currency adjustments. Table 5 presents the correlation matrix for major independent and dependent variables. The lower triangle displays the Pearson correlation and the upper triangle shows the Spearman correlation. Both methods use listwise-deletion to obtain complete observations. The results from these two methods are largely consistent.

4.4 Main Results

Table 6 to Table 9 presents the OLS results using intersegment revenue eliminations (*RevElimi*), yearly standard deviation of revenue to cost ratios (*sd_c_y*) and revenue to fixed assets ratios (*sd_a_y*), and number of business segments (*NBus*) as the proxy for firm's integration level. The linear probability model is chosen over the logit model to better accommodate the use of fixed effects and clustering.[18] In each of the four tables, column (1) and (2) are simple regressions with only the independent variable of interest. Column (3) and (4) include basic control variables for size, profitability, and foreign operation level (foreign currency exposure). Column (5) and (6) further add additional control variables that are relevant for each regression. In each of the four tables, column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. For every regression, including industry fixed effects decreases the significance of the main variable of interests but increases the overall fitness as measured by adjusted R^2. A plausible explanation is that the outcome variable (*Exclusion*) and the independent variable of interests (*RevElimi, sd_c_y, sd_a_y, NBus*) vary more across industries than within.

Table 6 presents the OLS results using intersegment revenue eliminations (*RevElimi*) as the proxy for firm's integration level. In all columns, intersegment revenue eliminations is not statistically significant in predicting the exclusion/inclusion decision of foreign currency adjustments. This weak result is probably due to the small sample of firms who report intersegment revenue

[18] Results from the logit model are even stronger. I present them in Appendix D.

eliminations, as mentioned previously. Nevertheless, the direction in all columns is consistent with my empirical hypothesis based on my model: firms with large intersegment revenue eliminations (a high integration level) are less likely to adopt foreign currency adjustments. Table 7 presents the OLS results using yearly standard deviation of revenue to cost ratios (*sd_c_y*) as the proxy for firm's integration level. In all columns, the yearly standard deviation is not statistically significant and the direction is opposite to my model prediction. This insignificance is likely a result of the drawbacks of this measure, as previously discussed. In all future analyses, I will not report results from this measure and instead will focus on the yearly standard derivation of revenue to fixed assets ratios only. Table 8 presents the OLS results using yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*) as the proxy for firm's integration level. In all columns, the yearly standard deviation of revenue to fixed assets ratios is statistically significant in the direction suggested by my model prediction; firms with high standard deviation of revenue to fixed assets ratios (a high integration level) are less likely to adopt foreign currency adjustments. Table 9 presents the OLS results using number of business segments (*NBus*) as the proxy for firm's integration level. In column (3) to (6), number of business segments is statistically significant in predicting the exclusion/inclusion decision. In all columns, the negative directions suggest that firms with large number of business segments (a high integration level) are less likely to adopt foreign currency adjustments. In sum, empirical results using intersegment revenue eliminations (*RevElimi*), yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*), and number of business segments (*NBus*) as proxies for firm's integration level are consistent with my model predictions, suggesting that my proposed integration level can serve as an explanation for firm's decision to adjust foreign currency impacts in executive compensation.

In order to better interpret the above proxies of firm's integration level as representing a high or low integration level, I further transform the raw measures of intersegment revenue eliminations (*RevElimi*), yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*), and number of business segments (*NBus*) into indicator variables (*RevElimi_i, sd_a_y_i,* and *NBus_i*) using their corresponding yearly median of all firms. These indicator variables equal to one if the firm's in-

tersegment revenue elimination/yearly standard deviation of revenue to fixed assets ratios/number of business segments is above the respective yearly median of all firms, representing firms with a high integration level. Table 10 presents the OLS results using transformed indicator variables of intersegment revenue elimination (*RevElimi_i*), yearly standard deviation of revenue to fixed assets ratios (*sd_a_y_i*), and number of business segments (*NBus_i*) as proxies for firm's integration level. The results are consistent with those from the raw measures in Table 6 to Table 9; firms with a high integration level are less likely to exclude foreign currency impacts.

Since intersegment revenue eliminations (*RevElimi*) and number of business segments (*NBus*) mainly capture internal transfers and perhaps indicate distinct currencies to a lesser degree, I interact these two proxies with measures representing the currency component: yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*) and number of currencies used to calculate the yearly standard deviation of revenue to fixed assets ratios (*n_a_y*). Table 11 presents the OLS results with the interaction terms. Each regression includes all relevant control variables, year fixed effects, and industry fixed effects. The main effects of intersegment revenue eliminations (*RevElimi*) and number of business segments (*NBus*) are consistent with those in Table 6 and Table 9. When interacting with the yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*), the coefficients are insignificant and the direction is negative in column (1). When interacting with the number of currencies used to calculate the yearly standard deviation of revenue to fixed assets ratios (*n_a_y*), the coefficients are negative and is further significant in column (4). These results suggest that conditional on having internal transfers, firms with higher number of foreign currencies are less likely to exclude foreign currency impacts. Overall, the interaction effects reinforce the main effects: firms with a high integration level are less likely to adopt foreign currency adjustments. In untabulated work, the results and conclusions using transformed indicator variables of intersegment revenue elimination (*RevElimi_i*), number of business segments (*NBus_i*), and yearly standard deviation of revenue to fixed assets ratios (*sd_a_y_i*) are similar.

4.5 Additional Analyses

4.5.1 Cross-sectional Tests

I run two cross-sectional tests to further examine the impacts of financial hedges (*Hedge*) and yearly exchange rate volatility (*vol, vol_lag1*) on firm's decision to adopt foreign currency adjustments.

Volatility: Apart from the main prediction on firm's integration level, the theoretical results from the decision problem further indicate that the investment threshold is increasing in exchange rate volatility. That is, the option created by foreign currency fluctuations is more valuable with higher exchange rate volatility. Thus, firms who face higher exchange rate volatility should be less likely to adopt foreign currency adjustments. In Table 6 to Table 9, when yearly exchange rate volatility (*vol*) is included as a control variable in each regression, the coefficients are positive and statistically significant, suggesting that a high exchange rate volatility is positively correlated with the exclusion decision. These results are reasonable as higher exchange rate volatility represents a greater foreign currency risk and some firms choose to exclude foreign currency impacts from executive compensation to protect executives against this risk. In order to test my model prediction, I need to examine the impacts of exchange rate volatility conditional on having cross-border transactions/internal transfers. Recall that for low integration firms, options created from foreign currency fluctuations have little to no value and so is exchange rate volatility. Table 12 presents the OLS results using the current year and last year exchange rate volatility (*vol, vol_lag1*) to interact with the three proxies for firm's integration level. Each regression includes all relevant control variables, year fixed effects, and industry fixed effects. The main effects of each proxy is consistent with those in Table 6 to Table 9. For every regression, the interaction term is negative but not statistically significant. These results weakly suggest that firms with higher exchange rate volatility are less likely to exclude foreign currency impacts.

Hedge: The relationship between having financial hedges and adopting foreign currency adjustments in executive compensation is not clear. Financial hedges generally use financial derivatives

such as option or forward contracts that are short-term (e.g. 12 months) in nature. They are used to reduce the volatility of financial outcomes. The goals of compensation contracts, however, as discussed previously, encourage managers to take actions for value creation activities, usually in long-term. Since financial hedges speak to financial outcomes directly whereas adopting foreign currency adjustments or not relates to managerial decision making, the linkage between the two, if any, is ambiguous. In Table 7 to Table 9, when financial hedges (*Hedge*) is included as a control variable in each regression, the coefficients are positive and statistically significant, suggesting that firms with financial hedges are more likely to exclude foreign currency impacts. These results are plausibly a consequence of the size effect: firms in my exclusion subsample are larger and have more foreign operations (foreign currency exposure). Once again, I need to examine the impacts of financial hedges conditional on having cross-border transactions/internal transfers. Table 13 presents the OLS results using financial hedges (*Hedge*) to interact with the three proxies for firm's integration level. Each regression includes all relevant control variables, year fixed effects, and industry fixed effects. For interaction terms, coefficients in column (2) and (3) are negative and it is statistically significant for number of business segments. Overall, it seems to suggest that conditional on having internal transfers, firms with financial hedges are less likely to adopt foreign currency adjustments. It is possible that these firms are more complex who use financial hedges to manage foreign currency risk while still include foreign currency impacts in executive compensation for stewardship purposes.

4.5.2 Switchers

As shown in Figure 2, during my sample period, there is an increasing trend in adopting foreign currency adjustments, from 2.72% in fiscal year 2007 to 26.59% in 2019. Consequently, there is a significant number of firms who adopt foreign currency adjustments for the first time during year 2007 to 2019. My sample thus can be divided into two groups: always inclusion/exclusion throughout the sample period and switchers who alter inclusion/exclusion decision during the sample period. The number of switcher is 355, with a majority switching from inclusion to exclusion.

Further, out of these 355 firms, there are 61 firms who have multiple switches during the sample period (e.g., from inclusion to exclusion to inclusion). These firms are likely to adjust foreign currency fluctuations *ex post* after observing corporate performance to remove unfavorable impacts.

To study whether a firm's integration level can predict a change in the inclusion/exclusion decision, I compare the group of always inclusion to switchers who adopt foreign currency adjustments for the first time during the sample period. Since the proxies of firm's integration level are sticky from year to year and the change in integration level needs some fundamental shifts in business which might take a longer horizon, I cannot simply examine the year of switch or compute the change in proxies and the change in the inclusion/exclusion decision. Instead, I still conduct my analyses using level regressions, with carefully chosen groups. I use the always inclusion group (*Exclusion*=0 $\rightarrow$ 0) and switchers who change their foreign currency adjustments decision from inclusion to exclusion (0 $\rightarrow$ 1) up to the year when the switch happens to see whether firms with a low integration level are more likely to adopt foreign currency adjustments.[19]

Table 14 presents the OLS results using intersegment revenue elimination (*RevElimi*), yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*), and number of business segments (*NBus*) as proxies for firm's integration level for groups of always inclusion and switchers who change from inclusion to exclusion only once during the sample period. The results are consistent with the main tests in previous tables.[20] Compare to the group of switchers who shift from inclusion to exclusion, firms in the always inclusion group on average have a higher integration level and thus are less likely to adopt foreign currency adjustments. Overall, this test reinforces my model prediction and suggests that a firm's integration level is associated with its decision of inclusion/exclusion of foreign currency impacts from accounting-based performance metrics.

[19]Firms with multiple switches are excluded.

[20]It is also true that the sample in this test is similar to the full sample because the number of firms in groups of always exclusion (1→1), switching from exclusion to inclusion (1→0), and multiple switches is limited.

4.5.3 Time Trends

Lastly, I explore any interesting time trends in adopting foreign currency adjustments in my sample period. In figure 2, the increasing trend of adopting foreign currency adjustments becomes steady since fiscal year 2015. I thus break my sample period into pre-2015 (e.g., fiscal year 2007-2014) and post-2015 (e.g., fiscal year 2015-2019). In untabulated work, I run the same regressions with proxies of firm's integration level to predict its inclusion/exclusion decision for the two time periods (pre-2015 and post-2015). There are no significant differences in proxies of firm's integration level before and after fiscal year 2015. This trend difference of adopting foreign currency adjustments pre- and post-2015 is probably a result of macro factors outside of individual firm characteristics.

I further examine whether the time trend of adopting foreign currency adjustments is clustered by industry. Table 15 describes the number of firms who exclude foreign currency impacts in each industry from fiscal year 2007 to 2019, the respective coefficient of variations, and the aggregated numbers pre- and post-2015. Industry is based on Fama and French 12-Industry Classification. Although for every industry, the number of firms who exclude foreign currency impacts increases during the sample period, some adoptions appear in early years and others in later years. Early adoptions of foreign currency adjustments are clustered around industries of nondurables, manufacturing, chemicals, business equipment, telecom, and health care. Later adopters are mainly from industries of oil and gas, utilities, retail, and entertainment. Comparing coefficient of variations of each industry, retail and entertainment exhibit higher level of variations, suggesting a greater level of adoption of foreign currency adjustments. This is largely consistent with my integration level prediction as firms in the retail and entertainment industry are more likely to have a low integration level.[21]

[21] In untabulated work, I calculate the adoption rate of foreign currency adjustments for each industry in each year (i.e., number of firms in each industry who have adopted foreign currency adjustments in a particular year divided by total number of firms in that industry). The retail and entertainment industry exhibit higher increase in the adoption rate.

Chapter 5: Conclusion

Motivated by the current practice disclosed in companies' proxy statements, in this paper, I study foreign currency adjustments in executive compensation (i.e., exclusion of foreign currency impacts from accounting-based performance metrics). Analytically, I apply option pricing theory to investigate FX fluctuations in firm's decision making and propose that firms with a high integration level (greater cross-border transactions between entities who operate under distinct currencies) should include FX impacts in their accounting-based performance metrics to achieve goal congruence. Empirically, I first provide descriptive evidence on the use of foreign currency adjustments. I next test my model predictions using intersegment revenue eliminations (*RevElimi*), standard deviation of revenue to cost ratios (*sd_c_y, sd_c*) and revenue to fixed assets ratios (*sd_a_y, sd_a*), and number of business segments (*NBus*) as proxies for firm's integration level. Empirical results are consistent with my model predictions: firms with a high integration level are less likely to adopt foreign currency adjustments. This paper is at the intersection of three different streams of literature – foreign currency, non-GAAP performance metrics for compensation, and executive compensation. It is also relevant for the current debate on the usage of non-GAAP adjustments for executive compensation. Finally, given the limitations in data availability to form proxies for *Integration Level*, my empirical results should not be over-interpreted. Future research direction includes finding potential global or local events that could alter firm's integration level in a significant way.

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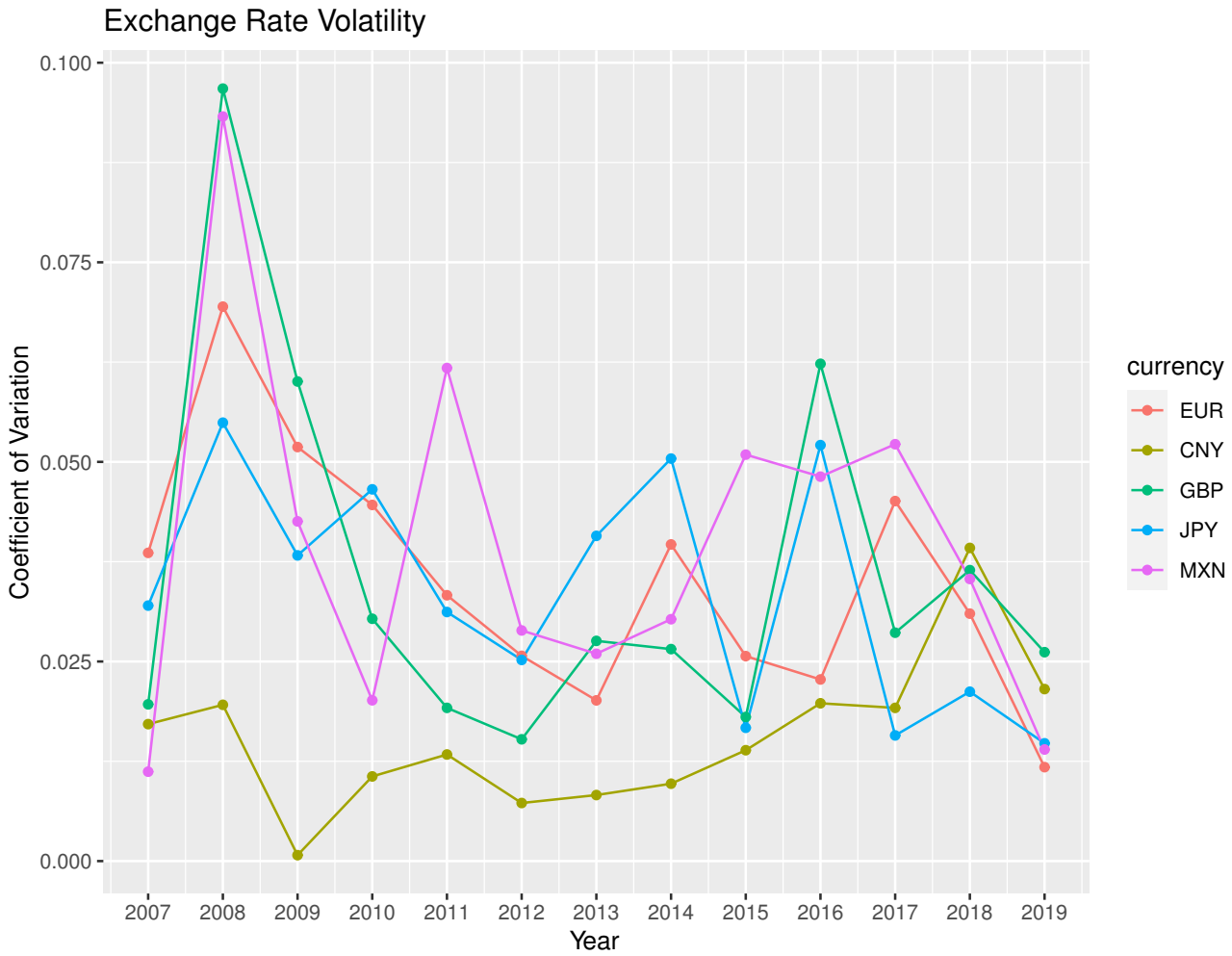
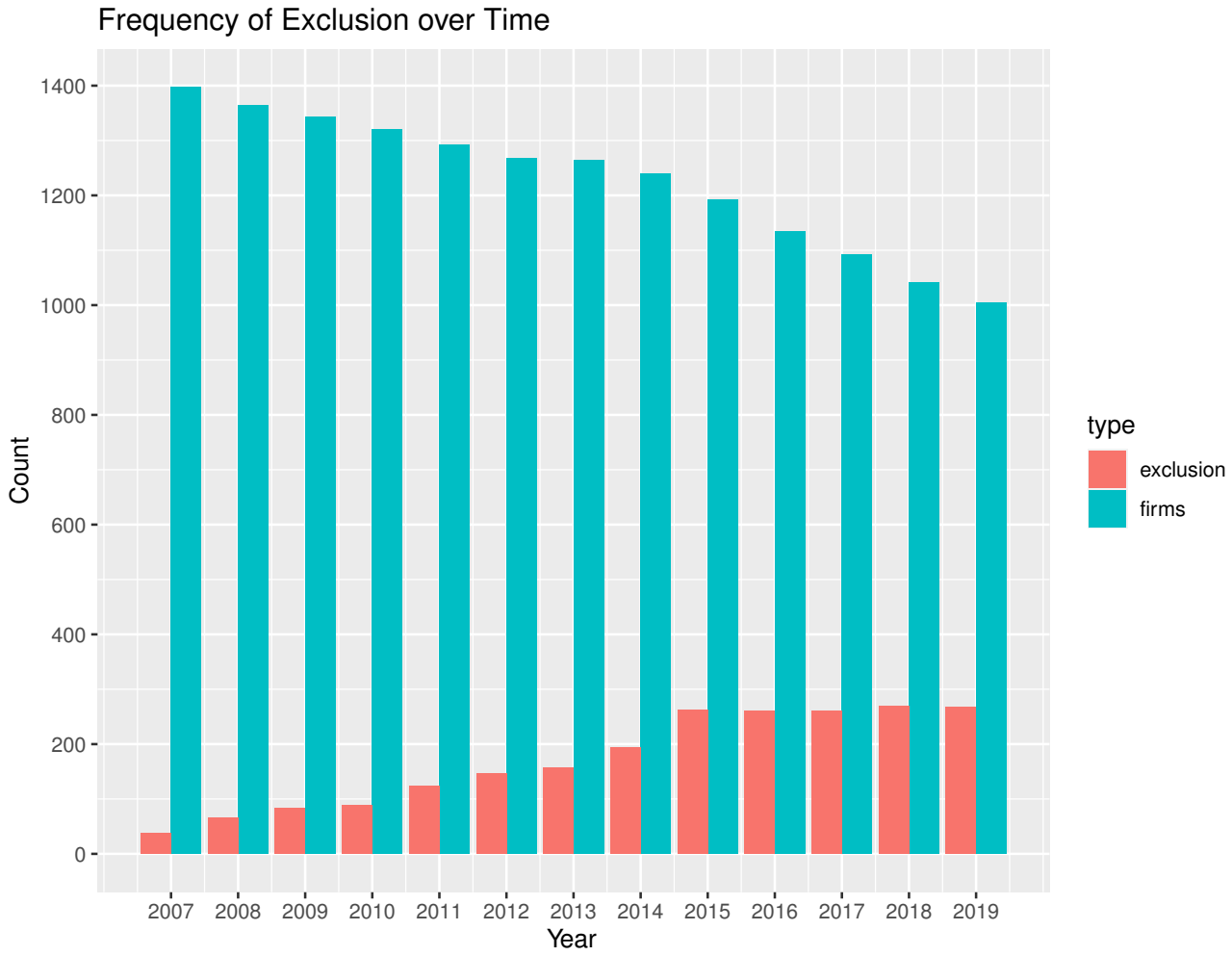
Figure 1: Exchange Rate Volatility



Note: This figure plots five major currencies' volatility, as measured by the coefficient of variation, for 2007 to 2019.

Figure 2: Frequency of Exclusion over Time



Note: This figure plots the number of firms each year, the number of firms who adjust foreign currency impacts (*Exclusion=1*), and the corresponding percentage. The final sample consists of 15,951 total and 2,216 exclusion firm-year observations from fiscal year 2007 to 2019.

Table 1: Sample Selection

This table describes the sample selection process. The sample period starts from fiscal year 2007 and ends in 2019.

	firm-years	**unique firms**
Compustat with variables indicating foreign activities	161,336	20,151
Remove: non-U.S. firms	−43,621	−5,764
Remove: financial institutions (SIC code: 6000-6999)	−56,702	−6,053
Remove: firms without foreign subsidiaries	−25,668	−4,029
Less: firms not covered by Execucomp	−19,394	−2,749
Full Sample	15,951	1,556
Exclusion Subsample	2,216	389
Inclusion Subsample	13,735	1,167

Table 2: Industry Distribution

This table describes the industry distribution of the exclusion subsample with the total number of firm-years, the number of firm-years where foreign currency adjustments is adopted, and their corresponding percentage. Industry is based on Fama and French 12-Industry Classification.

FF12	Name	Firms	Exclusion	Percentage
1	Nondurables	1,187	283	23.8%
2	Durables	604	87	14.4%
3	Manufacturing	2,420	385	15.9%
4	Oil Gas	604	28	4.6%
5	Chemicals	725	163	22.5%
6	Business Equipment	3,984	422	10.6%
7	Telecom	429	43	10.0%
8	Utilities	333	6	1.8%
9	Retail	1,952	229	11.7%
10	Healthcare	1,738	330	19.0%
12	Entertainment	1,975	240	12.2%
Total		15,951	2,216	

Table 3: Sample distribution of subsidiaries

This table describes the sample distribution of subsidiaries from the Orbis database. Panel A lists the top 10 regions where subsidiaries are located. Total number of subsidiaries obtained from Orbis for my sample of U.S. multinationals is 150,207 and the number of observations in the top 10 regions is 126,592, counting for 84.3%. Panel B shows the results for subsidiaries with populated financial information for fiscal year 2007 to 2019. The total number of observations is 189,163; roughly only 10% of the subsidiaries in Panel A have financial information populated in Orbis. Panel B1 lists the new order for top 10 regions and Panel B2 exhibits the count distribution by year.

Panel A: Top 10 Regions for Subsidiary Location

Country/Region	Currency	Count
US	USD	101,700
CANADA	CAD	5,516
UK	GBP	5,206
CHINA	CNY	2,756
NETHERLANDS	EUR	2,410
GERMANY	EUR	2,342
MEXICO	MXN	2,015
AUSTRALIA	AUD	1,839
FRANCE	EUR	1,592
HONG KONG	HKD	1,216
Top 10		126,592
Total		150,207

Panel B1

Country/Region	Currency	Count
UK	GBP	41,096
NETHERLANDS	EUR	15,349
GERMANY	EUR	14,098
FRANCE	EUR	10,701
ITALY	EUR	7,130
CHINA	CNY	6,732
SPAIN	EUR	6,357
INDIA	INR	6,239
AUSTRALIA	AUD	6,097
HONG KONG	HKD	5,602
Top 10		119,401
Total		189,163

Panel B2

Year	Count
2018	21,920
2017	21,880
2016	21,117
2019	20,112
2015	19,631
2014	19,029
2013	17,611
2012	16,159
2011	15,233
2010	8,972
2009	3,362
2008	2,311
2007	1,826
Total	189,163

Table 4: Summary Statistics

This table contains the summary statistics for all independent and dependent outcome variables. Detailed definitions are in Appendix B. Panel A and Panel B represent the exclusion subsample and the inclusion subsample, respectively. The full sample consists of 15,951 and 2,216 exclusion firm-year observations from fiscal year 2007 to 2019. All continuous variables are winsorized at 1 and 99 percentiles.

Panel A

Statistic	N	Pctl(25)	Mean	Median	Pctl(75)	St. Dev.
Exclusion	2,216	1	1.000	1	1	0.000
RevElimi	548	0.004	0.045	0.018	0.046	0.067
sd_c_y	1,514	−0.186	0.061	−0.179	−0.156	1.150
sd_a_y	1,801	−0.257	−0.029	−0.231	−0.143	0.833
NBus	2,216	0	2.276	1	4	2.076
Size	2,216	7.538	8.552	8.460	9.513	1.457
ROA	2,198	0.029	0.062	0.058	0.094	0.068
CICURR	2,155	8.400	115.222	29.100	105.455	217.081
RECTA	2,119	25.688	316.099	94.900	289.500	555.705
ForSales	2,216	0.244	0.422	0.436	0.583	0.223
EquityPay	2,216	0.507	0.686	0.645	0.755	0.448
Hedge	2,216	1	0.817	1	1	0.387
NGeo	2,216	2	4.154	4	5	2.766
ForSub	1,987	0.295	0.446	0.457	0.586	0.197
ForCountry	1,987	10	27.520	23	41	20.202
n_c_y	1,783	2	5.448	4	8	4.092
n_a_y	1,892	3	7.707	6	11	5.543
sd_c	1,736	−0.196	0.055	−0.189	−0.163	1.167
sd_a	1,906	−0.299	−0.068	−0.245	−0.122	0.667
n_c	1,885	3	7.580	6	12	5.100
n_a	1,934	5	10.252	9	14	6.680
OrbisRev	1,987	0.077	0.387	0.246	0.538	0.446
vol	1,987	0.014	0.024	0.023	0.032	0.016
vol_lag1	1,987	0.018	0.026	0.026	0.034	0.015

Panel B

Statistic	N	Pctl(25)	Mean	Median	Pctl(75)	St. Dev.
Exclusion	13,735	0	0.000	0	0	0.000
RevElimi	3,391	0.007	0.052	0.027	0.065	0.067
sd_c_y	4,572	−0.189	−0.020	−0.184	−0.169	0.944
sd_a_y	6,656	−0.263	0.008	−0.248	−0.175	1.040
NBus	13,688	1	2.344	2	4	1.834
Size	13,715	6.369	7.513	7.427	8.569	1.673
ROA	13,679	0.008	0.030	0.048	0.087	0.121

CICURR	13,468	0.224	38.532	3.325	21.855	119.287
RECTA	13,284	0.478	78.407	6.526	40.300	256.699
ForSales	13,653	0.022	0.297	0.250	0.495	0.273
EquityPay	13,695	0.343	0.572	0.556	0.716	0.462
Hedge	13,735	0	0.577	1	1	0.494
NGeo	13,688	2	3.265	3	4	2.695
ForSub	9,102	0.194	0.391	0.394	0.566	0.235
ForCountry	9,102	5	16.207	11	23	15.003
n_c_y	7,133	1	2.894	2	4	2.682
n_a_y	8,168	2	4.114	3	5	3.699
sd_c	6,878	−0.199	−0.014	−0.194	−0.170	0.953
sd_a	8,018	−0.313	0.016	−0.277	−0.132	1.063
n_c	8,287	2	4.562	3	6	3.895
n_a	8,735	2	6.300	5	9	5.122
OrbisRev	9,073	0.023	0.356	0.160	0.458	0.527
vol	9,102	0.0001	0.020	0.020	0.030	0.018
vol_lag1	9,102	0.0001	0.021	0.021	0.032	0.019

Table 5: Correlation Matrix

This table presents the correlation matrix for relevant independent and dependent variables. The lower triangle displays the Pearson correlation and the upper triangle shows the Spearman correlation. Both methods use listwise-deletion to obtain complete observations. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Exclusion		-0.050***	0.146***	0.096***	-0.079***	0.167***	0.065***	0.305***	0.091***	0.115***	0.063***	0.133***	0.079***	0.045***
(2) RevElimi	-0.042**		-0.104***	-0.072***	0.115***	0.149***	0.012	0.136***	-0.039**	-0.030*	-0.191***	0.008	-0.02	-0.024
(3) sd_c_y	0.031*	-0.042**		0.115***	0.030*	0.113***	0.063***	0.093***	0.087***	0.116***	0.145***	0.061***	0.02	0.025
(4) sd_a_y	-0.021	0.004	0.015		0.015	0.036**	0.048***	0.042**	0.110***	0.095***	0.263***	0.091***	0.099***	0.015
(5) NBus	-0.064***	-0.025	0.025	0.011		0.147***	-0.005	0.111***	0.027*	0.022	-0.076***	0.055***	0.058***	0.114***
(6) Size	0.153***	0.091***	-0.006	0.034*	0.187***		0.078***	0.632***	0.026	0.198***	-0.247***	0.261***	-0.018	-0.002
(7) ROA	0.082***	0.026	-0.008	0.005	0.004	0.112***		0.025	0.031*	-0.013	0.017	0.051***	0.02	0.004
(8) RECTA	0.215***	0.054***	0.002	0.019	0.059***	0.558***	0.044**		0.130***	0.137***	-0.053***	0.238***	0.136***	0.101***
(9) ForSales	0.090***	0.057***	0.059***	0.024	0.009	0.032*	0.025	0.127***		0.009	0.413***	0.194***	-0.011	0.464***
(10) EquityPay	0.094***	0.002	0.019	0.011	0.008	0.116***	-0.002	0.087***	-0.003		0.049***	0.091***	-0.029*	-0.006
(11) ForSub	0.073***	-0.101***	0.016	0.071***	-0.092***	-0.256***	0.023	-0.039**	0.430***	0.038**		0.097***	0.135***	0.193***
(12) Hedge	0.133***	-0.009	0.033*	0.01	0.063***	0.254***	0.047***	0.164***	0.196***	0.066***	0.102***		0.051***	0.106***
(13) vol	0.069***	-0.021	-0.009	-0.01	0.064***	-0.002	0.009	0.070***	0	-0.022	0.150***	0.050***		0.007
(14) NGeo	0.025	0.066***	0.028*	0.018	0.087***	0.022	-0.003	0.114***	0.430***	-0.031*	0.163***	0.069***	-0.013	

Table 6: Intersegment Revenue Eliminations

This table presents the OLS results using intersegment revenue elimination (*RevElimi*) as the proxy for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
RevElimi	−0.128	−0.164	−0.244	−0.248	−0.263	−0.196
	(0.202)	(0.192)	(0.196)	(0.177)	(0.255)	(0.247)
Size			0.005	0.014	−0.001	0.010
			(0.008)	(0.011)	(0.010)	(0.013)
ROA			0.212***	0.103	0.329***	0.157
			(0.070)	(0.073)	(0.102)	(0.108)
CICURR			−0.0001	−0.0001	−0.0001	−0.0002**
			(0.0001)	(0.0001)	(0.0001)	(0.0001)
RECTA			0.0001**	0.0001*	0.0001**	0.0001*
			(0.00005)	(0.00005)	(0.0001)	(0.0001)
ForSales			0.249***	0.258***	0.333***	0.289***
			(0.063)	(0.064)	(0.106)	(0.103)
EquityPay					0.029	0.028
					(0.028)	(0.027)
NGeo					−0.010*	−0.004
					(0.006)	(0.005)
Hedge					−0.009	−0.001
					(0.027)	(0.028)
vol					1.703**	0.980*
					(0.836)	(0.562)
Observations	3,924	3,924	3,793	3,793	2,780	2,780
Adjusted R^2	0.040	0.151	0.099	0.191	0.107	0.212
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 7: Yearly Standard Deviation of Revenue to Cost Ratios

This table presents the OLS results using yearly standard deviation of revenue to cost ratios (*sd_c_y*) as the proxy for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
sd_c_y	0.011	0.014	0.008	0.011	0.005	0.008
	(0.008)	(0.009)	(0.007)	(0.009)	(0.008)	(0.009)
Size			0.012	0.027**	−0.010	0.001
			(0.011)	(0.013)	(0.012)	(0.015)
ROA			0.386***	0.199**	0.319***	0.181**
			(0.116)	(0.092)	(0.106)	(0.088)
CICURR			−0.00003	−0.0001**	−0.0001	−0.0001**
			(0.0001)	(0.0001)	(0.0001)	(0.0001)
RECTA			0.0002***	0.0001***	0.0001**	0.0001
			(0.00005)	(0.00004)	(0.00004)	(0.00004)
ForSales			0.178*	0.255***	0.087	0.238***
			(0.098)	(0.081)	(0.083)	(0.082)
EquityPay					0.034**	0.018
					(0.016)	(0.018)
ForSub					−0.095	−0.190*
					(0.086)	(0.095)
ForCountry					0.003**	0.002
					(0.002)	(0.002)
n_c_y					0.014**	0.017**
					(0.007)	(0.007)
Hedge					0.067**	0.043
					(0.031)	(0.028)
vol					1.686**	1.344**
					(0.730)	(0.612)
OrbisRev					−0.026	−0.015
					(0.019)	(0.016)
Observations	6,049	6,049	5,812	5,812	5,804	5,804
Adjusted R^2	0.052	0.169	0.108	0.214	0.145	0.234
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 8: Yearly Standard Deviation of Revenue to Fixed Assets Ratios

This table presents the OLS results using yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*) as the proxy for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
sd_a_y	−0.013**	−0.012**	−0.016***	−0.013***	−0.020***	−0.017***
	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Size			0.020*	0.031**	−0.008	0.004
			(0.010)	(0.012)	(0.013)	(0.014)
ROA			0.350***	0.169**	0.290***	0.153**
			(0.089)	(0.074)	(0.083)	(0.072)
CICURR			−0.00003	−0.0001**	−0.0001	−0.0001**
			(0.0001)	(0.00005)	(0.0001)	(0.00005)
RECTA			0.0001***	0.0001***	0.0001**	0.0001*
			(0.00004)	(0.00004)	(0.00004)	(0.00004)
ForSales			0.138	0.228***	0.097	0.214***
			(0.091)	(0.074)	(0.074)	(0.072)
EquityPay					0.025*	0.020
					(0.013)	(0.014)
ForSub					−0.142**	−0.181**
					(0.058)	(0.069)
ForCountry					0.003**	0.002
					(0.001)	(0.002)
n_a_y					0.011**	0.012***
					(0.004)	(0.004)
Hedge					0.067**	0.045*
					(0.027)	(0.026)
vol					1.297***	0.975***
					(0.355)	(0.310)
OrbisRev					−0.027	−0.019
					(0.019)	(0.018)
Observations	8,405	8,405	8,085	8,085	8,071	8,071
Adjusted R^2	0.051	0.144	0.107	0.193	0.142	0.214
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 9: Number of Business Segments

This table presents the OLS results using number of business segments (*NBus*) as the proxy for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
NBus	−0.004	−0.002	−0.009**	−0.007*	−0.014***	−0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Size			0.017**	0.029***	0.014	0.030**
			(0.007)	(0.008)	(0.009)	(0.011)
ROA			0.190***	0.106***	0.281***	0.152***
			(0.035)	(0.028)	(0.057)	(0.053)
CICURR			0.00002	−0.00004	−0.00001	−0.0001*
			(0.00005)	(0.00005)	(0.0001)	(0.00005)
RECTA			0.0002***	0.0001***	0.0002***	0.0001***
			(0.00004)	(0.00003)	(0.00004)	(0.00003)
ForSales			0.153**	0.188***	0.139*	0.187***
			(0.065)	(0.046)	(0.078)	(0.059)
EquityPay					0.015	0.010
					(0.011)	(0.012)
NGeo					−0.002	0.002
					(0.004)	(0.004)
Hedge					0.061**	0.031
					(0.025)	(0.023)
vol					1.646***	0.869***
					(0.316)	(0.272)
Observations	15,809	15,809	15,197	15,197	10,543	10,543
Adjusted R^2	0.056	0.118	0.130	0.192	0.130	0.200
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 10: Indicator Variables Using Yearly Median

This table presents the OLS results using transformed indicator variables of intersegment revenue elimination (*RevElimi_i*), yearly standard deviation of revenue to fixed assets ratios (*sd_a_y_i*), and number of business segments (*NBus_i*) as proxies for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Each column includes all relevant control variables. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
RevElimi_i	−0.040*	−0.016				
	(0.022)	(0.026)				
sd_a_y_i			−0.018	−0.014		
			(0.017)	(0.017)		
NBus_i					−0.053***	−0.033**
					(0.015)	(0.015)
Observations	2,780	2,780	8,071	8,071	10,543	10,543
Adjusted R^2	0.108	0.211	0.140	0.212	0.129	0.199
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 11: Interactions

This table presents the OLS results with interaction terms of internal transfers variables (*RevElimi, NBus*) and distinct currencies variables (*sd_a_y, n_a_y*). Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Each column includes all relevant control variables, year fixed effects, and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion			
	(1)	(2)	(3)	(4)
RevElimi	−0.299	−0.184		
	(0.310)	(0.299)		
$RevElimi \times sd\_a\_y$	−0.030			
	(0.052)			
$RevElimi \times n\_a\_y$		−0.003		
		(0.072)		
NBus			−0.016***	−0.005
			(0.005)	(0.005)
$NBus \times sd\_a\_y$			0.0004	
			(0.002)	
$NBus \times n\_a\_y$				−0.002*
				(0.001)
sd_a_y	0.004		−0.017**	
	(0.011)		(0.007)	
n_a_y		0.011**		0.017***
		(0.005)		(0.005)
Observations	2,209	2,560	8,071	9,555
Adjusted R^2	0.223	0.239	0.214	0.220
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry

Table 12: Volatility

This table presents the OLS results using the current year and last year exchange rate volatility (*vol, vol_lag1*) to interact with the four proxies for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Each column includes all relevant control variables, year fixed effects, and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
RevElimi	−0.162	−0.153				
	(0.197)	(0.187)				
$RevElimi \times vol$	−1.881					
	(8.221)					
$RevElimi \times vol\_lag1$		−2.134				
		(8.631)				
sd_a_y			−0.012**	−0.015**		
			(0.006)	(0.007)		
$sd\_a\_y \times vol$			−0.239			
			(0.170)			
$sd\_a\_y \times vol\_lag1$				−0.069		
				(0.174)		
NBus					−0.010**	−0.009**
					(0.004)	(0.004)
$NBus \times vol$					−0.028	
					(0.155)	
$NBus \times vol\_lag1$						−0.064
						(0.144)
vol	1.079*		0.956***		0.935*	
	(0.629)		(0.312)		(0.530)	
vol_lag1		0.986		0.980***		1.010*
		(0.593)		(0.337)		(0.531)
Observations	2,780	2,780	8,071	8,071	10,543	10,543
Adjusted R^2	0.212	0.211	0.214	0.214	0.200	0.200
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 13: Hedge

This table presents the OLS results using financial hedges (*Hedge*) to interact with the three proxies for firm's integration level. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Each column includes all relevant control variables, year fixed effects, and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion		
	(1)	(2)	(3)
RevElimi	−0.415		
	(0.413)		
$RevElimi \times Hedge$	0.274		
	(0.568)		
sd_a_y		−0.010	
		(0.012)	
$sd\_a\_y \times Hedge$		−0.009	
		(0.017)	
NBus			0.003
			(0.006)
$NBus \times Hedge$			−0.017**
			(0.008)
Hedge	−0.014	0.045*	0.070**
	(0.020)	(0.026)	(0.034)
Observations	2,780	8,071	10,543
Adjusted R^2	0.212	0.214	0.201
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Cluster	Industry	Industry	Industry

Table 14: Switchers

This table presents the OLS results using intersegment revenue elimination (*RevElimi*), yearly standard deviation of revenue to fixed assets ratios (*sd_a_y*), and number of business segments (*NBus*) as proxies for firm's integration level for groups of always inclusion and switchers who change from inclusion to exclusion only once during the sample period. Variable definitions are in Appendix B. All continuous variables are winsorized at their 1st and 99th percentiles. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level. ***,**,* Denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

	Dependent variable: Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
RevElimi	−0.075*	−0.079*				
	(0.044)	(0.046)				
sd_a_y			−0.003**	−0.003		
			(0.002)	(0.002)		
NBus					−0.003***	−0.002***
					(0.001)	(0.001)
Observations	2,245	2,245	6,216	6,216	8,480	8,480
Adjusted R^2	0.024	0.026	0.023	0.030	0.023	0.031
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Table 15: Time Trend by Industry

This table describes the number of firms who exclude foreign currency impacts in each industry from fiscal year 2007 to 2019, the respective coefficient of variations, and the aggregated numbers pre- and post-2015. Industry is based on Fama and French 12-Industry Classification.

FF12	**Name**	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	CoV	pre	post
1	Nondurables	6	8	13	15	18	21	23	25	29	29	28	35	33	0.4261	129	154
2	Durables	1	3	3	3	5	5	6	9	9	9	10	12	12	0.5503	35	52
3	Manufacturing	9	11	13	13	21	26	26	31	44	46	48	48	49	0.5230	150	235
4	Oil Gas	0	0	0	0	0	1	1	3	3	5	5	5	5	1.0355	5	23
5	Chemicals	3	15	8	8	10	12	13	15	17	18	19	18	17	0.4265	74	89
6	Business Equipment	9	20	22	21	27	33	34	37	49	43	42	43	42	0.3642	203	219
7	Telecom	0	0	0	2	3	3	4	6	7	5	5	3	5	0.7024	18	25
8	Utilities	0	0	0	0	0	0	0	1	1	1	1	1	1	1.1242	1	5
9	Retail	3	5	8	7	9	9	10	18	30	34	34	31	31	0.7016	69	160
10	Healthcare	6	12	11	14	19	23	24	27	39	39	38	39	39	0.4882	136	194
12	Entertainment	1	1	5	6	11	14	16	22	35	32	30	34	33	0.7137	76	164

Appendix A: Examples of FX adjustments in Proxy Statements

Table A.1: Coca Cola FY2018 Proxy Statement (p.52)

IMPORTANT FACTS ABOUT OUR INCENTIVE TARGETS

Rigor of Incentive Metrics	**Choice of Incentive Metrics**
The Compensation Committee holds an additional dedicated meeting each year to test the robustness and rigor of our incentive metrics. The Compensation Committee recognizes the importance of achieving an appropriate balance between rewarding executives for strong performance over both the short- and long-term and establishing realistic but rigorous targest that continue to motivate and retain executives. In setting our performance payout curves, the Compensation Committee considered the following: • Performance levels necessary to achieve our long-term goals and deliver superior shareowner returns • The likelihood of achieving various levels of performance based on historical results over a ten-year period • Metrics, program designs and results at companies in our comparator group • Performance relative to our comparator companies	To evaluate performance in a manner consistent with how management evaluates our operating results and trends, the key financial metrics in our annual and long-term incentive plans are measured on a non-GAAP basis. We make certain adjustments when calculating these results, such as for the impact of foreign currency exchange rates, items impacting comparability, changes in financial accounting reproting regulations and costs and other financial implications associated with corporate transactions. Our targets are currency neutral because the Compensation Committee believes incentive targets should measure the underlying results of the business, and business leaders should be encouraged to make decisions that drive long-term sustainable growth rather than to address short-term currency fluctuations. This philosophy has been in place for several years, and we review this issue regularly, as it is an important concern for global companies like ours with significant exposure to foreign currency exchange rate fluctuations.

Table A.2: Home Depot FY2018 Proxy Statement (p.39)

As in prior years, the LDC Committee also included in the pre-established definitions of sales and operating profit under the MIP an adjustment to neutralize the impact of any change (positive or negative) in currency exchange rates during the fiscal year. This adjustment reflected the significant volatility in exchange rates and the increase in the value of the U.S. dollar against other currencies, in particular the Canadian dollar and the Mexican peso, that has occurred over the last several years. The LDC Committee noted that adjustments for currency fluctuations are not uncommon for large multinational corporations. These fluctuations represent external, macro-economic influences outside of the control of the executive officers, and LDC Committee believes that they should not affect incentive opportunities.

Table A.3: Pfizer FY2018 Proxy Statement (p.106)

Financial Measures (Billions, except per common share data)	**2018**	**2017**
GAAP Revenues	53.6	52.5
Foreign exchange impact relative to rates in effect for budget purposes	0.6	(0.7)
Exclusion of non-recurring items	0	0.3
Non-GAAP Revenues for Annual Incentive Purposes	54.3	52.2

Appendix B: Variable Definitions

Variable	Definition	Source
Outcome Variable		
Exclusion	An indicator variable equals one if the firm excludes foreign currency impacts from accounting-based performance metrics (i.e., adopt foreign currency adjustments)	Proxy Statements
Independent Variables		
RevElimi	Intersegment revenue eliminations out of total revenue each year. Total revenue is the aggregated revenue of all business segments or geographic segments or operating segments.	Compustat Segment
RevElimi_i	An indicator variable equals one if the firm's intersegment revenue elimination is above the yearly median of all firms and zero otherwise	Compustat Segment
sd_c_y (sd_c)	A yearly standard deviation (one standard deviation for all years) of revenue to cost ratios across subsidiaries' and the parent firm's locations with distinct currencies. It is standardized by subtracting the sample mean and divided by the sample standard deviation.	Orbis, Compustat Segment
sd_a_y (sd_a)	A yearly standard deviation (one standard deviation for all years) of revenue to fixed assets ratios across subsidiaries' and the parent firm's locations with distinct currencies. It is standardized by subtracting the sample mean and divided by the sample standard deviation.	Orbis, Compustat Segment
sd_a_y_i	An indicator variable equals one if the firm's yearly standard deviation of revenue to fixed assets ratios is above the yearly median of all firms and zero otherwise	Orbis, Compustat Segment

NBus	Number of business segments	Compustat Segment
NBus_i	An indicator variable equals one if the firm's number of business segments is above the yearly median of all firms and zero otherwise	Compustat Segment
Control Variables		
Size	Natural logarithm of total assets	Compustat
ROA	Return on asset, computed as net income divided by total assets	Compustat
CICURR	Currency translation adjustment in comprehensive income, absolute value	Compustat
RECTA	Cumulative translation adjustment in retained earnings, absolute value	Compustat
ForSales	Foreign sales (sales in countries other than the U.S.) divided by revenue	Compustat Segment, Compustat
EquityPay	Equity pay, including stock awards (STOCK_AWARDS) and option pay (OPTION_AWARDS) $ in thousands, divided by total pay (TDC1) $ in thousands for CEO only	Execucomp
vol	Weighted average of exchange rates volatility (measured as coefficient of variation) of nine currencies relevant to my sample. Weights are calculated as revenues in one currency to total subsidiaries' revenues, both converted to dollar amounts using year end exchange rate.	Orbis, FRED
vol_lag1	Weighted average of last year's exchange rates volatility (measured as coefficient of variation) of nine currencies relevant to my sample. Weights are calculated as revenues in one currency to total subsidiaries' revenues, both converted to dollar amounts using year end exchange rate.	Orbis, FRED
ForSub	Number of foreign subsidiaries divided by total number of subsidiaries	Orbis
ForCountry	Number of foreign countries/regions where subsidiaries are located	Orbis
n_c_y (n_c)	Number of currencies used to calculate the yearly standard deviation (one standard deviation for all years) of revenue to cost ratio	Orbis

n_a_y (n_a)	Number of currencies used to calculate the yearly standard deviation (one standard deviation for all years) of revenue to fixed assets ratio	Orbis
OrbisRev	Aggregate revenue of all subsidiaries from Orbis divided by total revenue	Orbis, Compustat Segment
NGeo	Number of geographic segments	Compustat Segment
Hedge	An indicator variable equals one if the firm has foreign currency denominated debts or uses financial derivatives (e.g., option contracts, forward contracts) to manage foreign currency risk	10-Ks

Appendix C: Proofs

C.1 Proof of Lemma 2

θ is defined as the fraction of domestic investment cost to total investment cost. Investment costs in foreign and domestic currency are normalized to 1. The total investment cost in domestic currency is

$$I = \theta I_1 + (1-\theta)iX = \theta + (1-\theta)X.$$

$F(X)$ represents the value of the investment opportunity. The parent's investment problem now becomes:

$$F(X) = \max \quad E[(\frac{C}{r}X_T - \theta - (1-\theta)X_T)e^{-rT}].$$

By the Feynman-Kac formula, $F(X)$ satisfies the following ordinary differential equation (ODE):

$$\frac{1}{2}\sigma^2 X^2 F''(X) - rF(X) = 0.$$

The solution to this ODE takes the form: $F(X) = AX^\beta$, where A and β are constant. Plug in $F(X)$ and $F''(X)$ to the ODE, I solve for β :

$$\beta = \frac{1}{2} \pm \sqrt{\frac{1}{4} + \frac{2r}{\sigma^2}}.$$

Only the positive β is a reason solution according to the boundary condition $F(0) = 0$.[1]

In order to solve for A and the investment threshold X_T, I further need the value matching condition and the smooth pasting condition. The value matching condition states that the parent

[1]This condition comes from the fact that 0 is an absorbing boundary. The negative β is not consistent with $\lim_{x\to 0} X^\beta = 0$.

firm is indifferent between investing now or later at the threshold X_T,

$$F(X_T) = \frac{C}{r}X_T - \theta - (1-\theta)X_T.$$

The smooth pasting condition ensures that the value function, $F(X)$, is continuously differentiable at the threshold,[2]

$$F'(X_T) = \frac{C}{r} - (1-\theta).$$

Using the above conditions, the investment threshold is given by

$$X_T = \frac{(\frac{\beta}{\beta-1})\theta}{\frac{C}{r} - (1-\theta)}$$

and

$$A = \frac{[\frac{C}{r} - (1-\theta)]^\beta}{\beta[(\frac{\beta}{\beta-1})\theta]^{\beta-1}}.$$

The investment threshold X_T is increasing in θ (i.e. $\frac{dX_T}{d\theta} > 0$). A higher θ suggests that the total investment cost is less affected by the exchange rate. The parent firm would like to wait for a favorable exchange rate to maximize the cash inflows.

[2]In other words, the graphs of $F(X)$ and $\frac{C}{r}X - \theta - (1-\theta)X$ meet tangentially at the threshold.

Appendix D: Logit Regressions

Table D.1: Individual Proxies
This table presents the results of logistic regressions using intersegment revenue eliminations (*RevElimi*), yearly standard deviation of revenue to cost ratios (*sd_c_y*) and revenue to fixed assets ratios (*sd_a_y*), and number of business segments (*NBus*) as proxies for firm's integration level. Variable definitions are in Appendix B. Every regression includes all relevant control variables.

	Dependent variable:			
	Exclusion			
	(1)	(2)	(3)	(4)
RevElimi	−2.756***			
	(0.859)			
sd_c_y		0.044		
		(0.029)		
sd_a_y			−0.121***	
			(0.034)	
NBus				−0.103***
				(0.014)
Constant	−2.910***	−3.110***	−3.025***	−4.112***
	(0.397)	(0.301)	(0.254)	(0.184)
Observations	2,791	5,840	8,119	10,599
Controls	Yes	Yes	Yes	Yes
Log Likelihood	−1,161.008	−2,926.406	−3,757.270	−4,521.178
Akaike Inf. Crit.	2,344.016	5,880.812	7,542.539	9,064.357
Note:				*p<0.1; **p<0.05; ***p<0.01

Table D.2: Interactions

This table presents the results of logistic regressions with interaction terms of internal transfers variables (*RevElimi, NBus*) and distinct currencies variables (*sd_a_y, n_a_y*). Variable definitions are in Appendix B. Each column includes all relevant control variables.

	Dependent variable:			
	Exclusion			
	(1)	(2)	(3)	(4)
RevElimi	−2.985***	−4.205***		
	(0.937)	(1.527)		
$RevElimi \times sd\_a\_y$	−0.834			
	(1.175)			
$RevElimi \times n\_a\_y$		0.151		
		(0.171)		
NBus			−0.124***	−0.107***
			(0.015)	(0.024)
$NBus \times sd\_a\_y$			0.003	
			(0.017)	
$NBus \times n\_a\_y$				−0.005*
				(0.003)
sd_a_y	0.106		−0.101*	
	(0.075)		(0.052)	
n_a_y		0.097***		0.153***
		(0.021)		(0.013)
Constant	−1.784***	−2.243***	−2.938***	−3.131***
	(0.510)	(0.495)	(0.251)	(0.240)
Observations	2,218	2,571	8,119	9,611
Controls	Yes	Yes	Yes	Yes
Log Likelihood	−1,027.369	−1,082.719	−3,814.375	−4,059.090
Akaike Inf. Crit.	2,084.737	2,195.439	7,658.750	8,148.181
Note:				*p<0.1; **p<0.05; ***p<0.01

Appendix E: Standard Deviation of Revenue to Cost (Fixed Assets) Ratios for All Years

Table E.1: Standard Deviation of Revenue to Cost Ratios

This table presents the OLS results using standard deviation of revenue to cost ratios (*sd_c_y*) for all years as the proxy for firm's integration level. Variable definitions are in Appendix B. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level.

	Dependent variable:					
	Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
sd_c	0.012	0.013	0.011	0.009	0.006	0.006
	(0.014)	(0.014)	(0.014)	(0.015)	(0.013)	(0.015)
Size			0.014	0.028**	−0.007	0.005
			(0.009)	(0.011)	(0.011)	(0.013)
ROA			0.315***	0.155**	0.259***	0.146**
			(0.074)	(0.064)	(0.069)	(0.067)
CICURR			−0.00001	−0.0001*	−0.0001	−0.0001**
			(0.0001)	(0.00005)	(0.0001)	(0.0001)
RECTA			0.0002***	0.0001***	0.0001***	0.0001**
			(0.00004)	(0.00004)	(0.00004)	(0.00004)
ForSales			0.175**	0.247***	0.095	0.228***
			(0.086)	(0.071)	(0.073)	(0.072)
EquityPay					0.024*	0.017
					(0.012)	(0.012)
ForSub					−0.089	−0.165*
					(0.070)	(0.083)
ForCountry					0.002	0.002
					(0.002)	(0.002)
n_c					0.012	0.011
					(0.008)	(0.008)
Hedge					0.044*	0.027
					(0.025)	(0.022)
vol					0.994***	0.668*
					(0.381)	(0.334)
OrbisRev					−0.021	−0.004
					(0.015)	(0.013)
Observations	8,561	8,561	8,223	8,223	8,206	8,206
Adjusted R^2	0.056	0.148	0.120	0.209	0.150	0.225
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry
Note:						*p<0.1; **p<0.05; ***p<0.01

Table E.2: Standard Deviation of Revenue to Fixed Assets Ratios

This table presents the OLS results using standard deviation of revenue to fixed assets ratios (*sd_c_y*) for all years as the proxy for firm's integration level. Variable definitions are in Appendix B. Column (1), (3), and (5) have year fixed effects and column (2), (4), and (6) have both year and industry fixed effects. Industry is based on Fama and French 48-Industry Classification. Standard errors are clustered at the industry level.

	Dependent variable:					
	Exclusion					
	(1)	(2)	(3)	(4)	(5)	(6)
sd_a	−0.014*	−0.012*	−0.017*	−0.014	−0.023***	−0.018**
	(0.008)	(0.007)	(0.009)	(0.008)	(0.008)	(0.007)
Size			0.018**	0.031***	−0.006	0.007
			(0.009)	(0.011)	(0.011)	(0.012)
ROA			0.299***	0.160***	0.243***	0.145**
			(0.069)	(0.059)	(0.063)	(0.057)
CICURR			−0.00001	−0.0001*	−0.0001	−0.0001**
			(0.0001)	(0.00005)	(0.0001)	(0.0001)
RECTA			0.0002***	0.0001***	0.0001***	0.0001**
			(0.00004)	(0.00003)	(0.00004)	(0.00004)
ForSales			0.141*	0.215***	0.085	0.192***
			(0.078)	(0.061)	(0.060)	(0.056)
EquityPay					0.018	0.013
					(0.011)	(0.012)
ForSub					−0.119**	−0.159**
					(0.050)	(0.059)
ForCountry					0.002	0.002
					(0.002)	(0.002)
n_a					0.009	0.008
					(0.006)	(0.006)
Hedge					0.056**	0.038
					(0.025)	(0.023)
vol					0.892***	0.578**
					(0.272)	(0.222)
OrbisRev					−0.022	−0.011
					(0.016)	(0.015)
Observations	9,871	9,871	9,467	9,467	9,448	9,448
Adjusted R^2	0.052	0.138	0.114	0.195	0.147	0.213
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry

Note: *p<0.1; **p<0.05; ***p<0.01