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The Strategic Disclosure of Currency Headwinds and Tailwinds

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The Strategic Disclosure of Currency Headwinds and Tailwinds

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Abstract

In this study, I examine whether companies are more likely to disclose revenue growth adjusted to remove the effects of foreign currency fluctuations (constant-currency revenue growth rates) when currency fluctuations decrease revenue growth (i.e., there is a currency headwind) than when currency fluctuations increase revenue growth. Public companies increasingly cite non-GAAP performance metrics when announcing earnings. While regulators see value in non-GAAP reporting, they continue to express concern that it is carried out inconsistently and in a misleading manner. Because the disclosure of constant-currency revenue growth is discretionary, companies have an incentive to strategically disclose it only when it benefits them to do so. I first create a novel proxy for the exchange rate impact on revenue and hand collect data on whether or not companies provide constant-currency revenue growth disclosures in earnings announcements. I find that when a company has a currency headwind, it is 146 percent more likely to disclose constant-currency growth rates. In addition, I examine aspects of the information environment and find some evidence suggesting that the effect decreases when information asymmetry is low.

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Dedication

This dissertation is dedicated to my dear wife, Kelli. I am forever grateful for her support.

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1. Introduction

Public companies increasingly cite non-GAAP performance metrics when announcing earnings (Black et al. [2018b]). Regulators at the Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB) have expressed concern about the increased reliance on non-GAAP measures, which are perceived by many as potentially misleading reporting (Leone [2010], Rapoport [2013], Teitelbaum [2015], Bricker [2016], Michaels and Rapoport [2016], Rapoport [2016], Schnurr [2016], White [2016], Golden [2017]). Despite this concern, regulators see value in non-GAAP reporting when it is used in conjunction with audited financial statements, and claim that investors often request the disclosures (Siegel [2004], Michaels and Rapoport [2016], White [2016], Golden [2017]). According to SEC Chair Mary Jo White, "non-GAAP financial measures… convey, in management's assessment, a clearer picture of how they see the company's results of operations in a way that GAAP results alone may not convey" (White [2016]). This recognition of the potential value of non-GAAP reporting, combined with the view that managers use non-GAAP disclosures to mislead investors, has caused the FASB to consider whether improvements to financial statements are needed. One of the potential solutions involves disaggregating the income statement, which would essentially standardize some non-GAAP metrics (Golden [2017]).

Due to the concerns over non-GAAP reporting, the SEC's Chief Accountant recently called for continued research on the matter, including obtaining a better understanding of the determinants of non-GAAP reporting (Bricker [2017]). Recent studies show that companies use non-GAAP earnings to make informative disclosures and remove one-time, transitory items (Curtis et al. [2014], Black et al. [2018a]). Consistent with this, prior research on non-GAAP reporting finds that non-GAAP earnings are more value-relevant and more persistent than GAAP

earnings (Bradshaw and Sloan [2002], Bhattacharya et al. [2003], Brown and Sivakumar [2003], Frankel and Roychowdhury [2005]). However, a significant proportion of firms use non-GAAP earnings opportunistically by, among other things, excluding recurring expenses (Black and Christensen [2009], Doyle et al. [2013], Curtis et al. [2014]).

To date, the non-GAAP literature has focused exclusively on non-GAAP earnings measures, despite several studies that show that revenue is value relevant (Swaminathan and Weintrop [1991], Davis [2002], Ertimur et al. [2003], Jegadessh and Livnat [2006], Chandra and Ro [2008]). Moreover, according to the Wall Street Journal (WSJ), firms have increasingly reported a non-GAAP metric known as constant-currency revenue growth in periods when the dollar has strengthened (Chasan [2015]). Constant-currency revenue growth reflects a firm's revenue growth adjusted to remove the effects of foreign currency fluctuations, and the metric is often one of the first reported in earnings announcements. In periods when the dollar strengthens, the translation of revenue denominated in a foreign currency reduces revenue growth when compared to the prior year. Thus, GAAP revenue growth will be lower than constant-currency revenue growth. I refer to foreign currency fluctuations that cause a decrease in revenue growth when compared to the prior year as "currency headwinds". The opposite is true when the dollar weakens (i.e., GAAP revenue growth is higher than constant-currency revenue growth). I refer to the opposite as "currency tailwinds", since the change in exchange rates accelerates revenue growth. Carol Tomé, the CFO of Home Depot, claims that companies strategically report constant-currency growth rates. According to Tomé, when the dollar weakens and boosts revenue growth, "you rarely hear companies point out the benefits" (Chasan [2015]). Harris and Rajgopal (2018) interviewed CFOs about currency reporting and state that several of the

interviewees made similar comments. In the WSJ article, the author notes that this inconsistency in the reporting of constant-currency growth rates is a major a concern to the SEC.

When managers do not disclose currency effects, prior literature suggests that it is possible to estimate currency effects by combing geographic segment disclosures with exchange rates. For example, Roberts (1989) and Li et al. (2014) find that models that combine macroeconomic data with geographic segments result in superior forecasts. In addition, Bartov and Bodnar (1994) show that investors fail to use all available information regarding foreign currency impacts and demonstrate that a trading strategy derived from those results earns abnormal returns. Taken together, these results suggest that financial statement users should be able to reasonably estimate foreign currency revenue impacts without management disclosure, although it requires more effort.

Theory predicts that managers will strategically disclose foreign currency impacts. The Incomplete Revelation Hypothesis (IRH), an extension of the Efficient Market Hypothesis (EMH), proposes that information that is more costly to extract from public data is less likely to be impounded in stock prices (Bloomfield [2002]). Thus, managers are motivated to make it more difficult for investors to uncover negative information. This prediction is supported by prior research. For example, Schrand and Walther (2000) find that managers compare current earnings to prior-period earnings that exclude gains (but not losses) from the sale of property, plant, and equipment. Consistent with the IRH, the authors conclude that managers make these disclosures because they believe that investors and analysts will have a difficult time recalling the specifics of the prior-period gains and losses. In other words, retaining information or returning to prior-period earnings announcements to reacquire the information requires resources, and managers do not expect that investors and analysts will expend those resources.

Motivated by concerns by regulators about inconsistencies in the disclosure of constant-currency growth rates, the importance of revenue for valuation, the lack of research on non-GAAP revenue metrics, and evidence from prior literature (i.e., the IRH) on the implications of strategic disclosure, I examine whether companies with currency headwinds are more likely to voluntarily disclose constant-currency revenue growth rates than companies with currency tailwinds.

I begin by creating a novel proxy that captures whether a company has a currency headwind. To create the proxy, *FXImpact*, I first identify all unique geographic segments disclosed in 10-K filings. Then, when possible, I associate each unique segment with a specific currency. For geographic segments that cannot be linked to a specific currency (e.g., "Rest of World, "South America"), I substitute the WSJ Dollar Index, which tracks the movement of a basket of currencies against the dollar. I then use the weighted-average exchange rate from both the current-period and the prior-period to approximate the year-over-year effect of foreign currency fluctuations on revenue growth.[1]

My initial sample consists of 53,956 firm-quarters from mid-2002 through 2015 for which required variables are not missing. I then retain 6,946 firm-quarters where the absolute value of *FXImpact* is greater than or equal to 5 percent. I do this to avoid the miscategorization of headwind and tailwind observations, to create a more manageable sample for hand collection, and to focus on the tails of the distribution where I expect strategic disclosure to be more prevalent. Finally, I take a random sample of 1,000 firm-quarters to use for data collection. Of

[1] When compared with the disclosed effect of foreign currency fluctuations, *FXImpact* appears to be a suitable proxy. The mean (median) percentage difference between the two variables is 4.5% (1.4%). Additionally, the two variables are highly correlated, with a Pearson correlation coefficient of 0.98 (p-value < .0001). See section 3.1 for additional information.

these, I am unable to find earnings announcements for 57, resulting in a final sample of 943 firm-quarters.

Using logistic regression, I regress the disclosure of constant-currency growth rates on a categorical variable created from my proxy, *FXImpact*. I find that when a company has a currency headwind, it is 146 percent more likely to disclose constant-currency revenue growth rates. These results are consistent with the argument that, due to the costs that investors incur when extracting information about the effects of currency fluctuations on GAAP revenue growth rates, managers are motivated to make strategic disclosures that provide the highest possible growth rate. In subsequent tests, I find some evidence suggesting that the extent of strategic disclosure is increasing in the magnitude of the currency impact on revenue.

Next, I perform cross-sectional tests to investigate the effects of the information environment on the strategic disclosure implied by my main results. I focus on firm size, institutional ownership, and analyst following as proxies for the strength of the information environment because these characteristics have been shown to influence company disclosure choices. The results provide some evidence suggesting that the extent of strategic disclosure is lower among firms with strong information environments.

In addition, I provide robustness tests using a sample of headwind-tailwind pairs. For each pair I require that both observations are from the same firm, and that the tailwind observation occurs within four quarters before or after the headwind observation. This results in a sample of 673 pairs. I also create a subset of this sample that consists of only pairs for which the tailwind occurs after the headwind. This sample has 299 pairs. I find that nearly 90 percent of the headwind-tailwind pairs are consistent in disclosure choice between the two quarters. However, of the pairs where disclosure is inconsistent, approximately 75 percent are

opportunistic in their disclosure choice (i.e., they only disclose when facing a currency headwind). Using McNemar's Test of marginal homogeneity, I find strong statistical evidence supporting my hypothesis that firms are more likely to disclose constant-currency revenue growth rates when there is a currency headwind. Finally, I use the same logistic regressions from my main sample to test both paired samples and find results that are consistent with my main hypothesis that firms with currency headwinds are more likely to disclose constant-currency revenue growth rates.

My paper makes several contributions. First, I contribute to the ongoing discussion surrounding non-GAAP performance metrics. As previously discussed, while regulators at the SEC and the FASB support non-GAAP reporting, they are concerned that non-GAAP figures are frequently computed or reported in a misleading manner. In an effort to combat this, the SEC has revised non-GAAP guidelines and the FASB is considering disaggregating the income statement, which would essentially standardize several non-GAAP metrics. My findings provide support for these efforts since I examine a previously unexplored non-GAAP figure and provide evidence suggesting that managers disclose it strategically. In particular, I expect my findings will be of interest to standard setters as they consider which income statement line items should be disaggregated and how they should be disaggregated.

I also contribute to prior research on non-GAAP reporting by being the first to examine the reporting of non-GAAP revenue metrics. While there is a robust literature surrounding non-GAAP reporting, it centers around the reporting of non-GAAP earnings metrics. Thus, my paper is the first to document the common reporting of non-GAAP revenue metrics, and that managers are likely to make these disclosures strategically. My study therefore enhances our understanding of the use of non-GAAP metrics and the motivations behind their use.

My paper also contributes to the geographic segment reporting literature. Prior literature examines the effects of changes in reporting requirements, and how geographic disclosures affect forecasts and valuation. However, my paper demonstrates that geographic segment disclosures are also useful for estimating constant-currency revenue growth rates and for detecting managers who opportunistically disclose non-GAAP figures. Thus, I provide additional support for strong segment reporting requirements by documenting additional benefits of geographic disaggregation to financial statement users.

Finally, my findings should be of interest to investors and regulators because they highlight that manipulation can occur when non-GAAP metrics are *not* disclosed. While much of the concern surrounding non-GAAP reporting is fixated on the potential manipulation within disclosed non-GAAP metrics, the strategic withholding of non-GAAP metrics (as managers are incentivized to do when they benefit from a currency tailwind) can also be problematic.

The rest of this paper is organized as follows. Section 2 discusses prior literature and develops my hypotheses. Section 3 describes variable measurement, my sample, and research design. Section 4 provides the main results. Section 5 provides the results of the paired sample robustness tests, and Section 6 concludes.

2. Prior Literature and Hypothesis Development

2.1. Non-GAAP Reporting

Under the SEC's Regulation G, which was implemented in 2003 as part of the Sarbanes-Oxley Act, non-GAAP reporting is permitted, within limits. As non-GAAP reporting has continued to proliferate in the U.S. (Black et al. [2018b]), the SEC issued Compliance and Disclosure Interpretations (C&DI) on non-GAAP reporting in 2010 and 2016 to address questions regarding Regulation G. These C&DIs reflect increased concern among regulators at both the SEC and the FASB that non-GAAP metric reporting by public companies is gaining greater prominence than GAAP metrics, and that the non-GAAP figures can be misleading (Leone [2010], Rapoport [2013], Teitelbaum [2015], Bricker [2016], Michaels and Rapoport [2016], Rapoport [2016], Schnurr [2016], White [2016], Golden [2017]). Specifically, SEC Chair Mary Jo White identified "lack of consistency" and "cherry-picking" as "troublesome practices which can make non-GAAP disclosures misleading" (White [2016]).

At the same time, regulators see value in non-GAAP reporting. FASB board member Marc Siegel describes the combination of non-GAAP metrics with audited financial statements as "a powerful analytical tool in understanding the underlying business" (Siegel [2014]). SEC Chair White recently highlighted that companies are required to "tell their own stories in their MD&A" and that non-GAAP measures help financial statement users see that story (White [2016]). Similarly, FASB Chair Russell Golden has stated that investors often request and shape non-GAAP reporting (Golden [2017]). Golden also mentioned that increased non-GAAP disclosure might be a sign to the FASB that GAAP could be improved. Consistent with this, the FASB is considering disaggregating the income statement by requiring more subtotals. Such a change would essentially standardize some non-GAAP metrics. However, in order to do so it is

important for the FASB to "study non-GAAP measures that are used in practice" (Golden [2017]). In a recent presentation to accounting academics, SEC Chief Accountant Wesley Bricker suggested that non-GAAP measures should be a topic "for continued emphasis in accounting research", with a particular interest in the determinants of non-GAAP reporting (Bricker [2017])

The non-GAAP literature has attempted to answer whether non-GAAP reporting is motivated by informativeness or opportunism (Black et al. [2018b]), with several early papers supporting the motivation of improved information. Bhattacharya et al. (2003) find that non-GAAP earnings are more persistent than GAAP earnings, and several studies find that non-GAAP earnings are more value relevant (Bradshaw and Sloan [2002], Brown and Sivakumar [2003], Frankel and Roychowdhury [2005]). More recently, Curtis et al. (2014) examine the motivation to disclose transitory gains and find that, despite the income-decreasing nature of the non-GAAP adjustment, the most pervasive reason to provide the disclosure is to inform financial statement users. Black et al. (2018a) examine non-GAAP reporting and find that when firms change non-GAAP calculations, it is generally to improve informativeness.

However, several studies have found opportunism to be a significant source of the motivation for non-GAAP reporting. Black and Christensen (2009) examine whether managers use non-GAAP earnings to meet earnings targets. The authors find that managers often exclude recurring charges, such as stock compensation, depreciation, and research and development, to meet earnings targets. Additionally, they find that sporadic non-GAAP reporting firms are more likely to use non-GAAP reporting to meet targets. Doyle et al. (2013) find similar results, and also show that managers use non-GAAP reporting as a substitute for accruals earnings management when the latter is more costly. While Curtis et al. (2014) find that the majority of

non-GAAP disclosers do so to improve the information available to investors, the authors also show that a significant number of firms in their sample only disclose non-GAAP metrics opportunistically. Collectively, prior literature suggests that both motivations contribute to the observed disclosure of non-GAAP metrics.

To date, the non-GAAP literature has focused exclusively on non-GAAP earnings measures, despite several studies that show that revenue is value relevant. Swaminathan and Weintrop (1991) use Value Line forecasts of both revenue and earnings to measure surprises around earnings announcements. The authors find that both revenue and expenses have incremental explanatory power beyond earnings in explaining excess returns. Similarly, Davis (2002) examines internet companies and finds that revenue surprises, based on analyst forecasts, are associated with announcement-period returns after controlling for earnings surprises. Ertimur et al. (2003) provide evidence that stock prices react more to a revenue surprise than an expense surprise, and that in some situations, revenue is more value relevant than earnings. Jegadessh and Livnat (2006) show that revenue surprises are associated with more persistent future earnings growth than earnings surprises. In addition, the authors find that revenue surprises are related to future earnings announcement date returns, as well as post-announcement drift. This indicates that the market does not fully incorporate information about future earnings when revenue surprises are announced. Chandra and Ro (2008) find that the value relevance of revenue is pervasive, rather than only relevant in extreme cases such as earnings losses. In addition, the authors document that the value relevance of earnings has decreased over time whereas the value relevance of revenue has remained stable. Taken together, this research provides an opportunity and motivation for documenting non-GAAP revenue disclosures and understanding the motivation for such disclosures.

2.2. Currency Exchange Rates and Constant-Currency Growth

Under U.S. GAAP, the accounting is extremely complex for multinational firms that operate in foreign countries and with foreign currencies. At a high level, when a U.S. firm (a "reporting entity") has a foreign entity (referred to here as a subsidiary) with a functional currency that differs from the functional currency of the firm, the assets, liabilities, revenues, expenses, gains, and losses of the subsidiary must be translated into the currency of the reporting entity. The exchange rate used for the translation of income statement items is the average exchange rate over the reporting period. When the income statements from two different time periods are presented together (for example, Q1 2018 and Q1 2019), each period is translated using the average exchange rate of the respective period. Thus, due to foreign currency fluctuations, the comparative performance between two periods *before* translation is likely to differ from the comparative performance *after* translation.

As an example, Company X is located in the U.S. and its functional currency is the U.S. dollar (USD). Company X has a foreign entity, Entity Y, from which Company X earns all its revenue and income. Entity Y operates in Europe and its functional currency is the Euro (EUR).[2] Entity Y has year 1 revenue of €100 and year 2 revenue of €110, an increase of 10 percent. The average EUR/USD exchange rate is 1.20 in year 1 and 1.10 in year 2.[3] When Entity Y's revenue is translated into USD for presentation in Company X's financial statements, year 1 revenue is $120 and year 2 revenue is $121, an increase of only 0.8 percent. In order to highlight the pre-translation growth, Company X may present non-GAAP growth that removes the impact of the

[2] This example is extreme by design (i.e., all revenue is derived from a foreign entity) so that GAAP revenue growth can be more easily compared to constant-currency revenue growth.

[3] When exchange rates are quoted, the base currency is stated first and followed by the quote currency. In the example of EUR/USD, EUR is the base currency and USD is the quote currency. If the exchange rate quote for EUR/USD is 1.20, it signifies that one EUR can be exchanged for 1.20 USD.

currency fluctuation. This is accomplished by using the exchange rate from year 1 to translate both years. This is known as constant-currency growth and results in revenues of $120 and $132, respectively, or the same 10 percent growth rate as the company had in EUR.[4]

As demonstrated, constant-currency revenue growth adjusts a company's revenue growth to remove the effects of foreign currency fluctuations. In periods when the dollar strengthens, the translation of revenue denominated in a foreign currency reduces revenue growth when compared to the prior year. Thus, GAAP revenue growth will be lower than constant-currency revenue growth. I refer to foreign currency fluctuations that cause a decrease in revenue growth when compared to the prior year as "currency headwinds". This is because the change in exchange rates slows revenue growth. The opposite is true when the dollar weakens (i.e., GAAP revenue growth is higher than constant-currency revenue growth). I refer to the opposite as "currency tailwinds", since the change in exchange rates accelerates revenue growth.

To date, no studies have examined the disclosure of constant-currency revenue figures. Harris and Rajgopal (2018) provide some evidence through a survey of CFOs regarding how their firms measure, report, and manage foreign currency impacts. Of the respondents at public firms, 74 percent said that they provide constant-currency revenue figures when the impact from currency movements is greater than 5 percent. This is higher than for any other constant-currency accounting item on the survey question, although net income is a close second at 67 percent.[5] According to the WSJ, firms have increasingly reported constant-currency revenue growth in periods when the dollar has strengthened (Chasan [2015]). In the article, Carol Tomé, the CFO of Home Depot, claims that companies strategically report constant-currency growth

[4] Constant-currency growth is also commonly referred to as currency-neutral growth. I use the two interchangeably.
[5] The remaining items for this question of the survey, and the percentage of respondents who responded that they disclose constant-currency results when currency effects are material, are operating costs (44%), operating cash flow (24%), liabilities (11%), and assets (10%) (Harris and Rajgopal [2018]).

rates. According to Tomé, when the dollar weakens and boosts revenue growth, "you rarely hear companies point out the benefits" (Chasan [2015]). In the same article, the WSJ notes that this inconsistency in the reporting of constant-currency growth rates is a major a concern to the SEC. Some of the CFOs who participated in the survey from Harris and Rajgopal (2018) also participated in interviews with the authors, some of whom made statements similar to that of Tomé. In particular, one CFO is quoted saying, "[I]f there was a material currency impact, we would call it out…. Especially if the currency impact affected revenue…. We would not talk about it if the impact were favorable, but that is normal for any corporation" (Harris and Rajgopal [2018], p. 22). Anecdotally, these sources suggest that managers of public firms strategically disclose non-GAAP constant-currency figures.

2.3. The Incomplete Revelation Hypothesis and Strategic Disclosure

Theory derived from the Efficient Market Hypothesis (EMH) predicts that managers will strategically disclose constant-currency revenue growth. The EMH proposes that a market is efficient if security prices fully reflect all available information (Fama [1970]).[6] However, evidence suggests that the market fails to completely price all relevant information (Sloan [1996], Xie [2001], Hirshleifer and Teoh [2003], Cohen and Frazzini [2008], Cohen and Lou [2012], Callen et al. [2013]). In an effort to reconcile the EMH with the existence of such anomalies, Bloomfield (2002) posits the Incomplete Revelation Hypothesis (IRH), which states that "statistics that are more costly to extract from public data are less completely revealed in market prices" (Bloomfield [2002], p. 234).[7] The author explains that the process by which

[6] The EMH has three broad information subsets or categories: the weak form, the semi-strong form, and the strong form. When the form is not explicitly stated, one may assume that the semi-strong form is implied, which has the information subset of all *publicly* available information (Fama [1970], Jensen [1978], Fama [1991]). In the case of this paper, I also intend that any reference to the EMH is a reference to the semi-strong form.
[7] Bloomfield (2002) suggests that the IRH is an extension of the EMH, not a replacement.

information is impounded in stock prices begins with *data*—"ink spots on sheets of paper, or bits stored in a computer file" (Bloomfield [2002], p. 234). However, data is not useful until it has been extracted from its source and converted into a *statistic*—a "useful fact". This process requires resources or extraction costs, which can be the "cash costs of identifying, collecting, compiling, printing and processing data, or hiring others to do so" or "the cognitive difficulty of extracting information from data that has already been identified and collected" (Bloomfield [2002], p. 236). The costs required to extract facts from data vary across statistics. Hence, cost constraints prevent the most resource intensive statistics from being impounded in price, which results in EMH anomalies.[8]

One implication of the IRH, as noted by the author, is that managers are motived to make it more difficult (costly) for investors to find information if managers do not want the information to impact their firm's stock price. For example, a manager may "classify arguably ongoing expenses as nonrecurring or extraordinary items while reporting arguably unusual gains as part of operating income" or "announce pro forma earnings numbers that emphasize improvements relative to their own strategically chosen benchmarks, while making it more difficult for investors to observe other measures of performance" (Bloomfield [2000], p. 238).

Prior literature documents such behavior. Schrand and Walther (2000) investigate whether prior-period gains (losses) from the sale of property, plant, and equipment are included (excluded) from prior-period earnings when presented as a benchmark for current-period earnings. The authors find that managers are more likely to separately announce prior-period gains, which provides the lowest possible prior-period earnings. Schrand and Walther conclude

[8] Other authors have suggested similar enhancements to the EMH. Jensen (1978) suggests a version of the EMH in which "a market is efficient with respect to information set θ_t if it is impossible to make economic profits by trading on the basis of the information set θ_t", where economic profits are "returns net of all costs" (pg. 97). Fama (1991) describes this as an "economically more sensible version" (pg. 1575).

that "observed strategic disclosure decisions are consistent with a conjecture by managers that the nonrecurring nature of the prior-period gain/loss will be forgotten unless it is separately announced" (p. 151). In a controlled experiment, Krische (2005) finds that investors are affected by the strategic disclosure documented by Schrand and Walther (2000). The author also investigates the source of the effect and finds that it "is likely to be unintentional on the part of investors, resulting from limitations in their memory for the prior-period event" (p. 243). In addition, Curtis et al. (2014) find that a significant proportion of firms are opportunistic disclosers of transitory gains and losses.[9]

In terms of foreign currency impacts, the IRH suggests that managers are likely to seek to boost stock prices by opportunistically disclosing constant-currency figures. The prediction of strategic disclosure coincides with the statements of CFOs found in Chasan (2015) and Harris and Rajgopal (2018). In addition, prior research generally finds that stock prices are sensitive to changes in foreign exchange rates (Jorion [1990], Bartov and Bodnar [1994], Bartram and Bodnar [2012]). This supports the idea that a manager would be concerned that knowledge about negative foreign currency impacts might negatively affect their firm's stock price. Furthermore, Bartov and Bodnar (1994) show that investors fail to use all available information regarding foreign currency impacts, but that a trading strategy derived from those results earns abnormal returns. The authors attribute this shortcoming of investors "to the complexity of the relation between currency changes and firm performance, assets, and liabilities" (Bartov and Bodnar

[9] Additional research motivated by the IRH finds that firms with lower earnings have less readable annual reports (Li [2008]). The author suggests that this association is evidence of obfuscation, in an attempt to make it more difficult for investors to determine how poor performance is and delay the stock price impact of this information. However, the author and Bloomfield (2008) suggest that the association may be explained by the fact that negative performance can be more difficult to describe and results in more questions from investors. More recently, Bushee et al. (2018) compare the linguistic complexity of analyst questions on earnings conference calls to the complexity of management answers to determine whether complexity is evidence of obfuscation or simply a complex response to a complex question. The authors find that their measure of complexity is associated with information asymmetry.

[1994], p. 1783). Harris and Rajgopal (2018) find that the CFOs they interview share this sentiment, summarizing that "except at some high level… CFOs suspect that investors don't get [foreign currency]" (p. 20).[10] Taken together, these findings suggest that investors face high costs to extract and use data about foreign currency impacts, and that managers understand this.

2.4. Geographic Segment Reporting and Estimating Macroeconomic Effects

In spite of limited disclosure, complex accounting, and high extraction costs, Bartov and Bodnar (1994) demonstrate that investors have access to freely available information about currency impacts that can be used to generate excess returns. While the authors do not address estimating constant-currency revenue growth, their findings suggest that investors may be able to do so using the financial statements. Such estimates require geographic segment data. Public firms are required to disclose segment information in the 10-K annual report. These requirements were originally found in Statement of Financial Standards No. 14 (SFAS 14), which was superseded by Statement of Financial Standards No. 131 (SFAS 131) at the end of 1997. Under SFAS 14, firms were required to disclose both line-of-business segments and geographic segments, both of which presented the same level of detail, including revenues and earnings for each segment. In an effort to be more flexible, SFAS 131 instead requires that firms disclose operating segments using a "management view". In other words, a firm's disclosed operating segments should coincide with the way the firm is organized internally, such as by products and services, legal entity, customer type, geographic area, or another basis. Most firms continue to report by line-of-business (Herrmann and Thomas [2000]). SFAS 131 requires that a firm must also report geographic segments, unless the firm's operating segments are already reported by

[10] It is not just investors who struggle with foreign currency. Harris and Rajgopal (2018) state that, due to the complexity of foreign currency impacts, "it is infeasible for… managers to be informed of all the exposures on an ongoing basis" (pgs. 37-38), and that most internal financial data users do not understand the impacts.

geographic area. However, SFAS 131 changes geographic segments in two ways. First, geographic segments are more disaggregated. Previously, geographic segments were presented as geographic areas, which often include several countries per area. Instead, SFAS 131 requires country-level disclosure for all material countries (while immaterial countries may be grouped together). Second, SFAS 131 no longer requires the disclosure of geographic segment earnings. Unless a firm voluntarily discloses geographic earnings, the only geographical earnings in financial statements is domestic and foreign income before income tax, as required by SEC Regulation §210.4-08(h), General Notes to Financial Statements—Income Tax Expense (Rule 4-08(h)). Hence, SFAS 131 improves geographic segment disaggregation but weakens earnings visibility.[11]

Prior literature examines the potential usefulness of geographic segment disclosure, typically by combining geographic segment data with macroeconomic data, such as gross national product (GNP) or gross domestic product (GDP), to create geographic segment models. Early work examining earnings forecast predictability delivers mixed results. Using a sample of firms from the United Kingdom, Roberts (1989) finds that geographic segment models outperform the random walk. The author also documents that forecasts made using only geographic revenue perform as well as forecasts using geographic earnings. Conversely, Balakrishnan et al. (1990) examine U.S. firms and find little evidence that geographic segment disclosure improves earnings forecasts. However, both studies suffer from small samples. More recently, Li et al. (2014) examine a large, global sample and find that combining segment and

[11] Herrmann and Thomas (2000) find that most firms report by line-of-business after the enactment of SFAS 131. In addition, the authors document an increase in the proportion of country-level segments, a decrease in the proportion of broad geographic area segments, and a decrease in the disclosure of earnings by geographic segment.

macroeconomic data results in superior forecasts. Additionally, a trading strategy based on their forecasts earns future excess stock returns.

Further research examines the value relevance of geographic disclosures and initially find little evidence of an association between segment income and equity prices (Boatsman et al. [1993]). Similar to the forecasting studies, the sample from Boatsman et al. (1993) is relatively small. Rather than using segment earnings, Bodnar and Weintrop (1997) use Rule 4-08(h) domestic and foreign earnings disclosures and find that foreign earnings is value relevant and has a larger association coefficient than domestic earnings. The authors use geographic segment revenue growth as a proxy for growth opportunities to show that the larger association coefficient on foreign earnings is driven by greater growth opportunities. Bodnar and Weintrop (1997) suggest that their difference in results is due to their use of Rule 4-08(h), which provides a larger sample since materiality for disclosure is lower than with geographic segments. In addition, Rule 4-08(h) earnings is consistent across firms whereas SFAS 14 earnings may be any of a number of earnings figures, as selected by the firm. Additional studies examine the mispricing of foreign earnings. Thomas (1999) shows that investors underestimate the persistence of foreign earnings, and that this mispricing allows for the construction of a hedge portfolio that earns positive returns. Building on these results, Callen et al. (2005) find that domestic earnings contribute more to unexpected stock returns variability than foreign earnings. However, the difference in contribution decreases as investment by long-term institutional investors increases. The authors suggest that this may be evidence that sophisticated investors are better able to analyze public disclosures.

Several studies investigate the effects of the implementation of SFAS 131. As discussed, SFAS 131 increased the disaggregation of geographic segments by requiring country-level

disclosure. This change increased the predictive ability of geographic sales disclosures (Behn et al. [2002]). Additionally, while only 26 percent of firms continue to report geographic earnings after the enactment of SFAS 131, Hope et al. (2008) find that the value relevance of foreign earnings increases, and that the mispricing of foreign earnings no longer exists. Hope et al. (2009) show that geographic segment disaggregation drives this increase in value relevance. The changes required by SFAS 131 also improve analyst forecasts. Prior research finds that analyst forecasts are less accurate and more optimistic as international diversification increases (Duru and Reeb [2002]). In addition, the serial correlation of analyst forecast errors and post-earnings-announcement-drift based on analyst forecast errors also increase with greater international diversification (Kang et al. [2017]). However, Kang et al. (2017) find that both associations are significantly reduced after SFAS 131 becomes effective.

While SFAS 131 improved geographic disaggregation, the loss of earnings disclosure has negative consequences. After SFAS 131, non-disclosing firms are more likely to overinvest in foreign operations (Hope and Thomas [2008]) and have lower worldwide effective tax rates (Hope et al. [2013]). These findings suggest that managers use non-disclosure as a tool to hide empire building and tax-motivated income shifting (i.e., tax-avoidance) since it is more difficult for investors and government officials to identify the location of earnings. In addition, non-disclosure has real capital markets consequences. Hope et al. (2009) document lower foreign earnings value relevance for non-disclosing firms. Chen et al. (2018) investigate tax-motived income shifting and find that it is associated with an increase in several measures of information asymmetry. However, the result is concentrated in firms that discontinue geographic earnings disclosures after SFAS 131. Taken together, these results suggest that geographic earnings non-

disclosure increases obfuscation, which incentivizes negative management behavior and increases the difficulty of evaluating earnings.

As previously stated, many of the studies examining geographic segments combine segment and macroeconomic data to create firm-level measures of macroeconomic exposure. The general process consists of the following steps. First, obtain both the macroeconomic data and the most recent geographic segment data, which is only disclosed annually in the Form 10-K. Second, map the segments to the macroeconomic data. Since country-level disclosure is only required for material countries, reported segments often combine several countries. Common examples of these vague, geographic segments are "South America", "Europe, the Middle East and Africa", and "Rest of World". In such cases, a decision must be made how to allocate macroeconomic data to mixed-country segments. Finally, calculate each segment's macroeconomic exposure, which often involves a calculation for both the current and prior-year quarter. This extraction process is non-trivial, but the research discussed earlier demonstrated that the estimates created from the data have value. Combined with the findings of Bartov and Bodnar (1994), it is reasonable to assume that estimates of constant-currency revenue growth can be generated using the same process.

2.5. Hypothesis Development

The discussion above suggests that managers are incentivized to strategically disclose a statistic when managers believe (a) when not disclosed, the statistic is costly to extract, and (b) disclosure of the statistic impacts stock price. That is, the IRH provides theoretical support for the hypothesis that managers are likely to strategically disclose the impact of exchange rate fluctuations on revenue growth. If exchange rate fluctuations have an adverse effect on revenue growth (currency headwind), managers are incentivized to disclose the effect. Doing so allows a

manager to highlight the firm's organic growth and shift (some) blame for poor performance to exchange rate fluctuations. [12] Conversely, if exchange rate fluctuations have a positive effect on revenue growth (currency tailwind), managers are incentivized to withhold disclosure and attribute the positive performance to their own actions. Hence, I predict that managers will strategically disclose constant-currency growth rates. The preceding arguments form the basis for my first hypothesis, stated in the alternative form:

H1. Companies with currency headwinds are more likely to disclose constant-currency revenue growth rates.

I also expect that, as the size of currency headwinds increase, the likelihood of strategic disclosure will increase. Thus, my second hypothesis (stated in the alternative form) is as follows:

H2. The positive association between currency headwinds and the disclosure of constant-currency revenue growth rates is increasing in the magnitude of the currency headwind.

2.5.1. The Effect of Information Environment on Disclosure

Prior research suggests that companies with strong information environments may be less likely to make strategic disclosures. I focus my investigation on three factors that are associated with information environment: company size, sell-side analyst following, and institutional investor ownership. Prior research finds that company size is associated with both disclosure and tone of disclosure (Buzby [1975], Li [2010]). Litigation is a major factor as "larger firms expect

[12] Exchange rates are difficult to predict. The early work of Meese and Rogoff (1983a, 1983b) suggests that the best predictor is a random walk without drift. Rossi (2013) empirically analyses the ensuing exchange rate forecasting methods that have been proposed in the literature and finds that none of the predictors have strong out-of-sample predictability. The author concludes that there is no convincing evidence to overturn the theory that a random walk without drift is the best exchange rate predictor. In other words, "the best predictor of exchange rates tomorrow is the exchange rate today" (p. 1090). This implies that the negative (and positive) impact from exchange rates that a firm might face are not necessarily the result of poor forecasting on the part of management; both the firm's managers and its investors should predict unchanged exchange rates. Thus, it is reasonable for a manger to disclose exchange rate effects in an effort to avoid attribution for their impact.

to be sued more frequently" (Core [2001], p. 449), and Skinner (1997) finds that pre-disclosure lowers the conditional costs of lawsuits. In a study of the tone of forward-looking statements in 10-Q and 10-K MD&A, Li (2010) finds that larger firms have a more negative tone. The author suggests that this supports "the hypothesis that large firms are more cautious in their disclosure due to political and legal concerns" (Li [2010], p. 1070-1071). In addition, prior research suggests that the monitoring aspect of analyst following and institutional investor ownership may affect company disclosure choices and management behavior (Lang and Lundholm [1996], Bushee [1998], El-Gazzar [1998], Bushee and Noe [2000], Roulstone [2003], Ajinkya et al. [2005], Files et al. [2009]). This is, in part, because analysts and institutional investors are regarded as better processors of information, allowing data to be more thoroughly extracted into statistics.

The increase in litigation risk and the decrease in costs of information acquisition from these various factors lead me to expect that the strategic disclosure of constant-currency growth rates will decrease as the strength of the information environment increases. While my first hypothesis suggests that strategic disclosure will be evidenced by more disclosure of constant-currency revenue growth rates for companies with currency headwinds relative to currency tailwinds, the preceding discussion suggests that disclosure behavior should be less sensitive to currency fluctuations for companies with a strong information environment. My prediction about the association between the strategic disclosure of constant-currency growth rates and the strength of the information environment is summarized in the following hypothesis, stated in the alternative:

H3. The positive association between currency headwinds and the disclosure of constant-currency revenue growth rates is decreasing in the strength of the information environment.

3. Variable Measurement, Research Design, and Sample Selection

3.1. Variable Measurement

To test my hypothesis that currency headwinds are associated with the disclosure of constant-currency revenue growth rates, I create a proxy for the effect of exchange rate fluctuations on revenue growth (a proxy variable is necessary because the variable is only available when disclosed).[13] My proxy *FXImpact*, is created with the following steps. First, I obtain a list of all unique geographic segment names from Compustat. I manually match segment names to currencies when the segment name can be tied to a specific currency. For instance, I match "Germany" to the Euro and "China" to the Renminbi, while "South America" has no match since there is no single currency for South America. For the segments that have no match, I use the Wall Street Journal Dollar Index (BUXX). BUXX is an index of the U.S. dollar relative to a weighted basket of foreign currencies. The weighting is based on the results of a triennial foreign exchange survey published by the Bank for International Settlements. It includes 16 foreign currencies that, as of the 2013 survey, account for 80% of the trading in foreign exchange markets.[14] After I match every geographic segment to either a currency or BUXX, I compute the average exchange rate for every firm-quarter-segment, as well as the year-prior firm-quarter-

[13] In my sample, 25% of the earnings announcements include a constant-currency revenue growth rate. An additional 10% of the earnings announcements include information that allows for the calculation of a constant-currency revenue growth rate (e.g., "Currency negatively impacted revenue by $10 million.")

[14] Jorion (1990) and Bartov and Bodnar (1994) both examine the value-relevance of exchange rates and calculate changes in exchange rates using a similar trade-weighted exchange rate. Bodnar and Weintrop (1997) use the same method in their study of the valuation of foreign income. I improve upon the method by only using a trade-weighted exchange rate (BUXX) when segments are not currency-specific. My method is similar to other studies that combine geographic segments and macroeconomic data (Roberts [1989], Balakrishnan et al. [1990], Behn et al. [2002], Li et al. [2014]).

segment. I then calculate the quarter-over-quarter percent change for each segment and take the average of the segments in each firm-quarter, weighted by segment revenue. The resulting value is my proxy, *FXImpact*.[15]

My proxy is likely to differ from the actual value for at least three reasons. First, geographic segment revenue data is only available in the 10-K, which causes imprecise segment weights since quarterly segment revenue is unobservable. Second, the use of BUXX for ambiguous geographic segments means that the average exchange rates for those segments will not be accurate.[16] Lastly, firms may have hedges that offset the effect of foreign exchange changes. However, this is not likely to be a major concern. While many firms hedge currency risk, several studies find that the amount offset is relatively small (Bodnar et al. [1998], Allayannis and Ofek [2001], Guay and Korthari [2003], Bartram et al [2010], Huang et al. [2019]). For example, Huang et al. (2019) find that the mean (median) percentage of foreign sales hedged is only 10.4 percent (0 percent). In addition, when firms hedge currency exposure, the vast majority hedge cash flows (i.e., payables and receivables) rather than translations of reported figures, such as revenue (Harris and Rajgopal [2018]).[17]

Because of the potential for error in my proxy, I perform a number of validation tests and compare *FXImpact* to the 329 reported values from my hand-collected sample. The mean (median) difference between reported impact and *FXImpact* is 0.3% (0.2%) while the mean

[15] See Appendix A for examples of how *FXImpact* is calculated.
[16] The mean (median) percent of total revenue from foreign segments is 61% (59%) while the percent of total foreign revenue from segments where BUXX is used is 69% (78%). I do not find a significant difference between headwind and tailwind observations. For observations that disclose a constant-currency revenue growth rate, I find that the mean percent of total revenue from foreign segments is lower than for firms that do not disclose (57% versus 62%, respectively), while the mean percent of total foreign revenue from segments where BUXX is used is higher than for firms that do not disclose (75% versus 67%, respectively). However, I fail to find a statistical difference between disclosing and non-disclosing firms for the percentage of total revenue where BUXX is used. See the discussion in Section 4.1 and Table 3 for additional details.
[17] See also Gay and Nam (1998) and Huang et al. (2019).

(median) percentage difference is 4.5% (10.4%). The two variables are highly correlated, with a Pearson correlation coefficient of 0.98 (p-value < .0001). Further, regressing the reported impact on *FXImpact* results in a coefficient of 1.03 (p-value < .0001) and an adjusted R-squared of 0.96. Taken together, these tests indicate that *FXImpact* is a suitable proxy for the actual impact of currency fluctuations.

3.2. Research Design

My primary interest is in whether companies strategically disclose constant-currency revenue growth rates. To test my hypothesis, I develop the following model based on Li (2010):

$$\begin{aligned} Disclose_{i,t} = \; & \beta_0 + \beta_1 Headwind_{i,t} + \beta_2 DQ_{i,t} + \beta_3 Earn_{i,t} + \beta_4 Ret_{i,t} + \beta_5 CFRatio_{i,t} \\ & + \beta_6 ACC_{i,t} + \beta_7 Size_{i,t} + \beta_8 MTB_{i,t} + \beta_9 RetVol_{i,t} + \beta_{10} EarnVol_{i,t} \\ & + \beta_{11} NBSeg_{i,t} + \beta_{12} NGSeg_{i,t} + \beta_{13} Age_{i,t} + \beta_{14} MA_{i,t} + \beta_{15} SEO_{i,t} + \beta_{16} SI_{i,t} \\ & + \beta_{17} BigN_{i,t} + \beta_{18} Analyst_{i,t} + \beta_{19} Invest_{i,t} + \beta_{20} Q2 + \beta_{21} Q3 + \beta_{22} Q4 \\ & + \varepsilon \end{aligned} \quad (1)$$

where:

$Disclose_{i,t}$: one of two indicator variables, *Disc* or *DiscNumeric*, that measure the disclosure of information about the effect of foreign currency fluctuations on revenue;

$Headwind_{i,t}$: an indicator variable equal to one if *FXImpact* is negative, and zero otherwise;

$DQ_{i,t}$: disaggregation quality, a measure of the disaggregation of accounting data in the balance sheet and income statement, as measured by Chen et al. (2015);

$Earn_{i,t}$: quarterly earnings scaled by the book value of assets, winsorized at -3 and 3;

$Ret_{i,t}$: contemporaneous stock returns in the fiscal quarter, calculated using CRSP monthly return data;

$CFRatio_{i,t}$: quarterly cash flow from operations (for the three months ended in the current quarter) scaled by the book value of current liabilities;

$ACC_{i,t}$: quarterly earnings minus cash flow from operations (for the three months ended in the current quarter) scaled by the book value of assets;

$Size_{i,t}$: the logarithm of the market value of equity at the end of the quarter;

$MTB_{i,t}$: the market value of equity plus the book value of total liabilities, scaled by the book value of total assets;

$RetVol_{i,t}$: stock return volatility calculated using 12 months of monthly return data before the fiscal quarter ending date;

$EarnVol_{i,t}$: the standard deviation of earnings (scaled by book value of assets) calculated using data from the last five years, with at least three years of data required;

$NBSeg_{i,t}$: the logarithm of 1 plus the number of business segments;

$NGSeg_{i,t}$: the logarithm of 1 plus the number of geographic segments;

$Age_{i,t}$: the number of years since a firm appears in CRSP's monthly file;

$MA_{i,t}$: an indicator variable equal to one if a firm makes a merger or acquisition in a given fiscal quarter, and zero otherwise, calculated using data from SDC Platinum;

$SEO_{i,t}$: an indicator variable equal to one if a firm has a seasoned equity offering in a fiscal quarter, and zero otherwise, calculated using data from SDC Platinum;

$SI_{i,t}$: the amount of special items reported for the quarter, scaled by the book value of assets;

$BigN_{i,t}$: an indicator variable equal to one if a firm has a Big N auditor, and zero otherwise;

$Analyst_{i,t}$: the number of analysts in the last I/B/E/S consensus forecast prior to the earnings announcement;

$Invest_{i,t}$: the proportion of outstanding shares that are held by institutional investors in the quarterly reporting period;

Q2 (Q3 or Q4): an indicator variable equal to one if the current reporting quarter is the second (third or fourth) fiscal quarter, and zero otherwise; and

i and *t* firm and year-quarter indicators, respectively.

Disc is an indicator variable equal to one if a firm discloses a constant-currency growth rate in their earnings announcement, and zero otherwise. Some earnings announcements do not disclose an explicit constant-currency growth rate, but instead disclose information that allows

the calculation of a constant-currency growth rate (e.g., "Exchange rate fluctuations decreased revenue by $10 million.") Because the latter disclosure method requires more resources to process the data into a statistic, I make a distinction between the two methods and only set *Disc* equal to one when an explicit growth rate is disclosed. However, I create a second *Disclose* indicator variable, *DiscNumeric,* which is set equal to one if a firm discloses either a constant-currency revenue growth rate or provides information that allows for the calculation of a constant-currency revenue growth rate.

In this model, *Headwind* is the variable of interest. My first hypothesis predicts a positive coefficient on *Headwind*, indicating that a company with a currency headwind is more likely to disclose constant-currency revenue growth rates than a company with a currency tailwind. In estimating the regression specified in Model (1), I follow Li (2010) and include several variables that control for a variety of firm-specific factors that may be associated with the disclosure of constant-currency revenue growth rates. In addition, I include disaggregation quality, *DQ*, as a measure of disclosure quality because prior work links higher levels of disaggregated disclosures to disclosure quality (Chen et al. [2015]). I include fiscal quarter indicators because managers face fewer financial reporting constraints in interim quarters, which leads to greater stock market reactions to bad news (Mendenhall and Nichols [1988]). Thus, I expect disclosure of currency-neutral growth rates to be higher in the interim quarters than in the fourth quarter.

I exclude year fixed effects due to the strong relationship between my variable of interest, *Headwind*, and year. In eight out of the fourteen years in my sample, all of the observations within each year have the same value for *Headwind*.[18] This is expected because foreign

[18] I perform robustness tests in section 4.3 and find no time effects that affect the disclosure of constant-currency revenue growth rates.

currencies often move against the dollar in the same direction. I estimate Model (1) using logistic regression with robust standard errors clustered at the firm level.

I estimate the following model to determine whether the probability of disclosing constant-currency revenue growth rates for companies with a currency headwind increases as the magnitude of *FXImpact* increases:

$$Disclose_{i,t} = \beta_0 + \beta_1 Headwind_{i,t} + \beta_2 Magnitude_{i,t} + \beta_3 Headwind_{i,t} \times Magnitude_{i,t} + Controls + \varepsilon \quad (2)$$

where:

$Magnitude_{i,t}$: the absolute value of *FXImpact*; and

all other variables as previously defined. In Model (2), the variable of interest is $Headwind_{i,t} \times Magnitude_{i,t}$. H2 predicts that the coefficient on $Headwind_{i,t} \times Magnitude_{i,t}$ should be positive and significant. A positive and significant coefficient would indicate that the likelihood of strategic disclosure increases with the magnitude of the currency headwind.

Finally, H3 predicts that the strategic disclosure of constant-currency growth rates will be influenced by differences in the strength of the information environment. To investigate H3, I modify Model (1) as follows:

$$Disclose_{i,t} = \beta_0 + \beta_1 Headwind_{i,t} + \beta_2 Environment_{i,t} + \beta_3 Headwind_{i,t} \times Environment + Controls_{i,t} + \varepsilon \quad (3)$$

where:

$Environment_{i,t}$: one of three measures of information environment: *Size*, *Analyst*, or *Invest*; and

all other variables as previously defined. All three of the information environment variables, *Size*, *Analyst*, and *Invest*, are included as control variables in my prior models. When one of those variables takes the place of *Environment* in Model (3), that variable is omitted from the set of controls for the model. H3 predicts that β_3 will be negative and significant.

3.3. Sample Selection

My initial sample consists of 53,956 firm-quarters from mid-2002 through 2015. To calculate *FXImpact*, I require exchange rate information for the year-prior quarter for each observation. Because the BUXX index is only available beginning June 6, 2001, I require that the year-prior quarter for each observation begin on or after June 6, 2001. I obtain firm fundamental data from Compustat, analyst following data from I/B/E/S, stock price data from CRSP, currency exchange rates from OANDA, ownership data from Thomson Reuters, BUXX index values from The Wall Street Journal[19], and I hand-collect constant-currency disclosures from 8-K filings on EDGAR. My initial sample is restricted to observations where data is available to create my variables and where the year-prior 10-K has both a segment that is specifically identified as the United States and at least one other geographic segment. I require a specifically identifiable United States segment so that, when creating *FXImpact*, I do not apply the BUXX index to a segment that may include the United States.

After creating my initial sample, I limit the sample to observations where the absolute value of *FXImpact* is greater than or equal to 5 percent. I do this for three reasons. First, while my analysis shows that *FXImpact* is a good proxy for the actual currency impact, it is not perfect, and observations where *FXImpact* is close to 0 percent are more likely to be miscategorized as having positive (negative) currency fluctuations when the actual currency impact is negative (positive). Second, limiting the sample to large currency fluctuations facilitates the hand collection of disclosure data. Third, I focus on the tails of the *FXImpact* distribution because I expect that strategic disclosure will be more prevalent when *FXImpact* is large. The 5 percent *FXImpact* limit results in a sample of 6,946 firm-quarters. Finally, to better facilitate the hand collection of constant-currency disclosures, I take a random sample of 1,000 firm-quarters. Of

[19] See https://quotes.wsj.com/index/XX/CALCULATED/BUXX/historical-prices for historical BUXX figures.

Table 1
Sample reconciliation
This table provides the sample reconciliation. Because BUXX is available beginning June 6, 2001, and I require data from the year-prior quarter, my sample period begins in mid-2002. I initially identify all firm-quarter observations from mid-2002 – 2015 with sufficient data in the Compustat, CRSP, I/B/E/S, and Thomson Reuters databases to estimate the dependent and control variables in my models. I exclude observations for which the absolute value of *FXImpact*, my proxy for the effect of exchange rate fluctuations on revenue growth, is less than 5 percent. I then randomly select 1,000 firm-quarters for hand collection from the remaining observations. Because I am unable to find earnings announcements for 57 of the randomly selected observations, my final sample consists of 943 firm-quarter observations representing 519 unique firms.

	Observations
Initial sample with required variables (mid-2002 – 2015)	53,956
Absolute value of *FXImpact* < 5%	47,010
Observations considered for hand collection	6,946
Random sample for hand collection	1,000
Missing earnings announcement	57
Final sample	943

these, I am unable to find earnings announcements for 57 firm-quarters, resulting in a final sample of 943 firm-quarters.

4. Results

4.1. Descriptive Statistics

Table 2, Panel A presents descriptive statistics for my sample observations. 24.6 percent of observations disclose constant-currency revenue growth rates (*Disc*), and 34.9 percent of observations disclose either constant-currency revenue growth rates or information that allows for the calculation of constant-currency revenue growth rates (*DiscNumeric*). 35.2% of the observations are classified as having a currency headwind. The mean (median) absolute value of *FXImpact* (*Magnitude*) is 7.2% (6.6%). The mean (median) market value of equity (*Size*) is

Table 2
Descriptive statistics
This table presents descriptive statistics for sample observations. Panel A presents basic descriptive statistics. Panel B presents descriptive statistics stratified by headwind and tailwind. The paired t-test compares the mean of the variables using Welch's t-test. The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B.

Panel A: Basic descriptive statistics

Variable	N	Mean	SD	25%	Median	75%
Disc	943	0.246	0.431	0	0	0
DiscNumeric	943	0.349	0.477	0	0	1
Headwind	943	0.352	0.478	0	0	1
Magnitude	943	0.072	0.022	0.057	0.066	0.081
ForeignToTotal	943	0.608	0.164	0.481	0.595	0.714
BUXXToTotal	943	0.407	0.208	0.255	0.408	0.544
BUXXToForeign	943	0.693	0.319	0.436	0.780	1.000
Control Variables						
DQ	943	0.607	0.063	0.563	0.611	0.652
Earn	943	0.006	0.041	-0.001	0.011	0.025
Ret	943	0.029	0.277	-0.117	0.009	0.138
CFRatio	943	0.126	0.265	0.024	0.109	0.225
ACC	943	-0.017	0.050	-0.029	-0.012	0.001
Size	943	1,333.0	7.4	341.4	1,212.9	4,993.8
MTB	943	2.028	1.420	1.204	1.588	2.336
RetVol	943	0.123	0.070	0.075	0.107	0.153
EarnVol	943	0.034	0.075	0.007	0.014	0.033
NBSeg	943	3.628	1.665	2	4	5
NGSeg	943	5.608	1.470	4	6	7
Age	943	23.324	18.941	10.167	17.504	30.501
MA	943	0.224	0.417	0	0	0
SEO	943	0.007	0.086	0	0	0
SI	943	-0.005	0.032	-0.003	0.000	0.000
BigN	943	0.883	0.321	1	1	1
Analyst	943	5.633	7.626	0	2	9
Invest	943	0.690	0.260	0.573	0.752	0.865

Table 2 (Cont.)

Panel B: Descriptive statistics comparing headwinds and tailwinds

	Headwinds (n = 332)		Tailwinds (n = 611)		Paired t-test (p-value)
Variable	**Mean**	**Median**	**Mean**	**Median**	**Mean**
Disc	0.340	0	0.195	0	0.000***
DiscNumeric	0.437	0	0.301	0	0.000***
Headwind	1.000	1	0.000	0	0.000***
Magnitude	0.073	0.066	0.072	0.066	0.281
ForeignToTotal	0.601	0.578	0.612	0.606	0.353
BUXXToTotal	0.410	0.401	0.406	0.409	0.766
BUXXToForeign	0.696	0.781	0.692	0.777	0.853
Control Variables					
DQ	0.618	0.625	0.601	0.606	0.000***
Earn	0.000	0.010	0.010	0.012	0.002***
Ret	0.008	-0.010	0.041	0.021	0.108
CFRatio	0.121	0.104	0.129	0.112	0.705
ACC	-0.021	-0.013	-0.015	-0.011	0.061*
Size	1,430.8	1,275.4	1,281.8	1,163.3	0.425
MTB	2.064	1.545	2.008	1.609	0.581
RetVol	0.122	0.104	0.125	0.107	0.546
EarnVol	0.030	0.013	0.036	0.015	0.208
NBSeg	3.773	4	3.550	4	0.077*
NGSeg	5.607	6	5.607	6	0.999
Age	24.374	19.459	22.754	16.589	0.206
MA	0.235	0	0.218	0	0.547
SEO	0.012	0	0.005	0	0.282
SI	-0.006	0.000	-0.005	0.000	0.606
BigN	0.852	1	0.900	1	0.038**
Analyst	5.581	2.000	5.661	2.000	0.878
Invest	0.675	0.739	0.698	0.766	0.194

$1.333 billion ($1.213 billion). The mean (median) number of business segments (*NBSegs*) is 2.6 (3.0), while the number of geographic segments (*NGSeg*) is 4.6 (5.0). Mergers or acquisitions during the quarter (*MA*) are common (22.4%) while seasoned equity offerings (*SEO*) are rare (0.7%). Most observations have a Big N auditor (88.3%). The mean (median) number of analysts following is 5.6 (2.0). Finally, institutional investor ownership is high, with mean (median)

shareholdings of 69.0% (75.2%). Overall, my observations are larger, more diverse in business and geographic segments, have higher analyst following and higher institutional investor ownership when compared to the samples in most prior research (Li [2010]). This is likely due to my requirement that my observations have at least one non-U.S. geographic segment, which excludes many smaller public companies.

Table 2, Panel B presents mean and median descriptive statistics stratified by headwind. I find that *Disc* and *DiscNumeric* are both significantly larger for headwind observations.[20] Overall, the headwind and tailwind observations in my sample are relatively similar. However, I find that headwind observations have higher disaggregation quality (*DQ*), lower earnings (*Earn*), lower accruals (*ACC*), and higher number of business segments (*NBSeg*). In addition, headwind observations are less likely to have a Big N auditor (*BigN*).

Table 3 presents the mean and median for the variables *ForeignToTotal*, *BUXXToTotal*, and *BUXXToForeign*,[21] stratified by the direction of the impact of currency fluctuations (Headwind or Tailwind) as well as the disclosure of a constant-currency growth rate (Informative or Opaque). I include this table in order to determine if there is any relationship between the use of BUXX (i.e., the amount of revenue from broad geographic areas) and either (a) the direction of currency fluctuations or (b) the choice to disclose constant-currency revenue growth. I compare the mean of the variables using Welch's t-test.

In Panel A, the mean of the variables is compared between Headwind and Tailwind observations for (a) the entire sample, (b) only Informative (Disclose) observations, and (c) only Opaque observations. I fail to find a statistical difference between headwind and tailwind

[20] I compare sample means using Welch's unequal variances t-test.
[21] See Appendix B for variable definitions.

Table 3
Stratified comparisons of BUXX and foreign revenue variables
This table presents the mean and median for the variables ForeignToTotal, BUXXToTotal, and BUXXToForeign, stratified by the direction of the impact of currency fluctuations (Headwind or Tailwind) as well as the disclosure of a constant-currency growth rate (Informative or Opaque). In Panel A, the mean of the variables is compared between Headwind and Tailwind observations for (a) the entire sample, (b) only Informative (Disclose) observations, and (c) only Opaque observations. In Panel B, the mean of the variables is compared between Informative (Disclose) and Opaque observations for (a) the entire sample, (b) only Headwind observations, and (c) only Tailwind observations. Both panels compare the mean of the variables using Welch's t-test. The samples are constructed as disclosed in Table 1 and variable definitions are provided in Appendix B.

Panel A: Comparison of headwind and tailwind observations

	Headwinds		Tailwinds		t-test (p-value)
Variable	**Mean**	**Median**	**Mean**	**Median**	**Mean**
All Observations	**(n = 332)**		**(n = 611)**		
ForeignToTotal	0.601	0.578	0.612	0.606	0.353
BUXXToTotal	0.410	0.401	0.406	0.409	0.766
BUXXToForeign	0.696	0.781	0.692	0.777	0.853
Informative (Disclose) Only	**(n = 113)**		**(n = 119)**		
ForeignToTotal	0.560	0.549	0.575	0.591	0.362
BUXXToTotal	0.414	0.428	0.423	0.439	0.687
BUXXToForeign	0.748	0.823	0.756	0.845	0.827
Opaque Only	**(n = 219)**		**(n = 492)**		
ForeignToTotal	0.623	0.595	0.621	0.608	0.893
BUXXToTotal	0.408	0.378	0.401	0.409	0.742
BUXXToForeign	0.669	0.768	0.677	0.751	0.786

Table 3 (Cont.)

Panel B: Comparison of informative (disclose) and opaque observations

Variable	Informative (Disclose) Mean	Informative (Disclose) Median	Opaque Mean	Opaque Median	t-test (p-value) Mean
All Observations	**(n = 232)**		**(n = 711)**		
ForeignToTotal	0.567	0.560	0.621	0.606	0.000***
BUXXToTotal	0.419	0.428	0.403	0.397	0.260
BUXXToForeign	0.752	0.835	0.674	0.753	0.000***
Headwinds Only	**(n = 113)**		**(n = 219)**		
ForeignToTotal	0.560	0.549	0.623	0.595	0.000***
BUXXToTotal	0.414	0.428	0.408	0.378	0.776
BUXXToForeign	0.748	0.823	0.669	0.768	0.025**
Tailwinds Only	**(n = 119)**		**(n = 492)**		
ForeignToTotal	0.575	0.591	0.621	0.608	0.002***
BUXXToTotal	0.423	0.439	0.401	0.409	0.225
BUXXToForeign	0.756	0.845	0.677	0.751	0.005***

observations for all three variables across all three samples. This indicates that the use of BUXX is not a proxy for currency impacts.

In Panel B, the mean of the variables is compared between Informative (Disclose) and Opaque observations for (a) the entire sample, (b) only Headwind observations, and (c) only Tailwind observations. Across all three samples I find that *ForeignToTotal* is lower and *BUXXToForeign* is higher for Informative (Disclose) observations. However, I fail to find a difference for *BUXXToTotal*. This suggests that the choice to disclose is not associated with the percentage of revenue derived from broad geographic areas.

Table 4, Panel A presents the distribution of observations within the categories of headwind / tailwind and disclosure of the impact of currency fluctuations. In my sample, the disclosure rate of constant-currency revenue growth rates (*Disc*) is 19.5% for companies with a

Table 4
Sample distribution
This table provides the sample distribution stratified by the direction of the impact of currency fluctuations on revenue as well as the disclosure of a constant-currency growth rate. Panel A uses the variable *Disc* as a measure of disclosure and Panel B uses the variable *DiscNumeric*.

Panel A: Sample distribution by disclosure variable Disc

Disclose	Tailwind	Headwind
No	492	219
%	80.5%	66.0%
Yes	119	113
%	19.5%	34.0%
Total	611	332

Panel B: Sample distribution by disclosure variable DiscNumeric

Disclose	Tailwind	Headwind
No	427	187
%	69.9%	56.3%
Yes	184	145
%	30.1%	43.7%
Total	611	332

currency tailwind, and 34% for companies with a currency headwind, a difference of 14.5% (or a 74.4% greater disclosure rate). When my measure of disclosure is *DiscNumeric* the disclosure rate for companies with currency tailwinds and headwinds is 30.1% and 43.7%, respectively, a difference of 13.6% (or a 45.2% greater disclosure rate). The difference in disclosure is significant for both *Disc* and *DiscNumeric* (p-values ≤ 0.01). This provides initial support for

H1, indicating that companies with currency headwinds are more likely to disclose constant-currency revenue growth rates than companies with currency tailwinds.

4.2. Empirical Results

4.2.1. Main Tests of My Hypothesis

Table 5 presents the results from estimating Model (1). The dependent variables are *Disc* and *DiscNumeric* in Columns (1) and (2), respectively. In each column, I find a positive and significant coefficient on *Headwind* (p-values ≤ 0.01). The coefficient magnitudes suggest that, *ceteris paribus*, companies with a currency headwind are approximately 146 percent more likely than companies with a currency tailwind to disclose constant-currency revenue growth rates ($e^{0.899}$ - 1) and 101 percent more likely to disclose either constant-currency revenue growth rates or information that allows the calculation of constant-currency revenue growth rates ($e^{0.697}$ - 1).

In Table 6, I present the results from estimating Model (2), where *Headwind* is interacted with *Magnitude*, the size of *FXImpact*. *Magnitude* is split at the median in column (1), and is a continuous variable in column (2). In both columns, I find a positive and significant coefficient on the interaction between *Headwind* and *Magnitude* (p-values ≤ 0.01 and 0.10, respectively). The results suggest that the extent of strategic disclosure is increasing in the magnitude of the currency impact.

4.2.2. Information Environment

Tables 7-9 present results of my tests of H3, which investigates whether the strength of the information environment influences strategic disclosure. Table 7 examines company size as a measure of information environment. *Size* is split at the median in column (1), and is a continuous variable in column (2). In both columns, I find a positive and significant coefficient on *Headwind* (p-values ≤ 0.01, and 0.05, respectively), consistent with my primary results. The

Table 5
The association between currency headwinds and the disclosure of constant-currency growth rates

This table presents logistic regression results in which the dependent variable is *Disclose*, an indicator variable that measures the disclosure of information about the effect of foreign currency fluctuations on revenue. In column (1), the dependent variable is *Disc*, and is equal to one if a firm discloses a constant-currency revenue growth rate. In column (2), the dependent variable is *DiscNumeric*, and is equal to one if a firm discloses either a constant-currency revenue growth rate or provides information that allows for the calculation of a constant-currency revenue growth rate. The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) Disc			(2) DiscNumeric		
Headwind	*0.899*	***	*(0.000)*	*0.697*	***	*(0.000)*
DQ	0.804		(0.704)	1.762		(0.373)
Earn	10.640	**	(0.021)	10.800	**	(0.010)
Ret	0.144		(0.719)	0.102		(0.764)
CFRatio	-1.115	**	(0.019)	-1.223	**	(0.014)
ACC	0.080		(0.982)	1.313		(0.685)
Size	0.177	**	(0.038)	0.130		(0.121)
MTB	-0.033		(0.666)	-0.085		(0.270)
RetVol	-5.400	**	(0.013)	-5.880	***	(0.002)
EarnVol	-3.816		(0.335)	-7.901		(0.112)
NBSeg	0.372		(0.150)	0.373		(0.135)
NGSeg	-0.538	**	(0.049)	-0.724	***	(0.005)
Age	0.010		(0.102)	0.009		(0.169)
MA	-0.152		(0.475)	-0.036		(0.852)
SEO	-0.912		(0.520)	1.277		(0.198)
SI	-8.813	**	(0.022)	-8.994	**	(0.014)
BigN	0.013		(0.976)	0.165		(0.676)
Analyst	-0.032	**	(0.032)	-0.049	***	(0.001)
Invest	1.144	**	(0.026)	0.617		(0.174)
Q2	-0.208		(0.246)	-0.191		(0.251)
Q3	-0.207		(0.423)	-0.296		(0.193)
Q4	-0.502	**	(0.025)	-0.429	**	(0.044)
Constant	-2.795	**	(0.028)	-1.425		(0.228)
Observations	943			943		
Year FE	NO			NO		
Cluster	FIRM			FIRM		
Pseudo R^2	0.152			0.165		
Area Under ROC Curve	0.762			0.767		

Table 6
The effect of the magnitude of currency headwinds on the association between currency headwinds and the disclosure of constant-currency growth rates
This table presents logistic regression results in which the dependent variable is *Disc*, an indicator variable that measures the disclosure of constant-currency revenue growth rates. *Magnitude* is split at the median in column (1), and is a continuous variable in column (2). The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) Median			(2) Continuous		
Headwind	0.486	**	(0.045)	-0.012		(0.985)
Magnitude	-0.136		(0.552)	-4.387		(0.403)
Headwind × Magnitude	*0.801*	***	*(0.009)*	*12.560*	*	*(0.059)*
DQ	0.749		(0.724)	0.790		(0.710)
Earn	10.660	**	(0.021)	10.460	**	(0.021)
Ret	0.126		(0.746)	0.148		(0.705)
CFRatio	-1.193	***	(0.009)	-1.152	**	(0.014)
ACC	-0.088		(0.980)	-0.059		(0.986)
Size	0.189	**	(0.029)	0.183	**	(0.033)
MTB	-0.035		(0.643)	-0.035		(0.649)
RetVol	-5.397	**	(0.014)	-5.345	**	(0.013)
EarnVol	-3.830		(0.320)	-3.764		(0.346)
NBSeg	0.361		(0.168)	0.355		(0.171)
NGSeg	-0.544	**	(0.048)	-0.544	**	(0.045)
Age	0.010		(0.130)	0.010		(0.113)
MA	-0.144		(0.504)	-0.138		(0.521)
SEO	-0.987		(0.482)	-1.038		(0.477)
SI	-8.688	**	(0.024)	-8.614	**	(0.025)
BigN	-0.062		(0.880)	-0.032		(0.940)
Analyst	-0.032	**	(0.035)	-0.031	**	(0.040)
Invest	1.194	**	(0.018)	1.181	**	(0.022)
Q2	-0.177		(0.325)	-0.197		(0.268)
Q3	-0.195		(0.455)	-0.217		(0.405)
Q4	-0.431	*	(0.055)	-0.491	**	(0.029)
Constant	-2.728	**	(0.034)	-2.484	*	(0.064)
Observations	943			943		
Year FE	NO			NO		
Cluster	FIRM			FIRM		
Pseudo R^2	0.159			0.155		
Area Under ROC Curve	0.767			0.765		

interaction between *Headwind* and *Size* is negative in both columns, but only significant in column (1) (p-value ≤ 0.05). This provides some evidence that strategic disclosure is less likely among large companies.

In Table 8 I present the results from estimating Model (3) with analyst following as the measure of information environment. Like Table 7, *Analyst* is split at the median, and is a continuous variable in columns (1), and (2), respectively. I find a positive and significant coefficient on Headwind in both columns (p-values ≤ 0.01). However, the results suggest that analyst following has no effect on strategic disclosure (p-values > 0.10).

Table 9 presents the results of modeling institutional investor ownership as a measure of information environment. The coefficient on *Headwind* continues to be positive and significant (p-values ≤ 0.01). I find that the coefficient on *Invest* is positive and significant across both columns (p-values ≤ 0.05, and 0.01). The coefficient on the interaction *Headwind* × *Invest* is negative across both columns and significant in column (2) (p-value ≤ 0.01).

Collectively, the results in Tables 7–9 provide some support for my hypothesis that the extent of strategic disclosure will be lower for firms with strong information environments.

4.3. Robustness Tests

Because I exclude year fixed effects from all models, I investigate whether there are year effects that that affect my prior results. In Table 10, column (1), I restrict my sample to years 2005 through 2011. During these years, there is greater intra-year variance in *Headwind*, which allows for the inclusion of year fixed effects. The coefficient on *Headwind* is positive and significant (p-value ≤ 0.05), consistent with prior results. In column (2), I use the full sample and include the indicator variable *Late* instead of year fixed effects. *Late* is equal to one if the year is 2010 or later, and zero otherwise. I split my sample on the year 2010 as it is roughly at the

Table 7
The effect of firm size on the association between currency headwinds and the disclosure of constant-currency growth rates
This table presents logistic regression results in which the dependent variable is *Disc*, an indicator variable that measures the disclosure of constant-currency revenue growth rates. *Size* is split at the median in column (1), and is a continuous variable in column (2). The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) Median			(2) Continuous		
Headwind	1.389	***	(0.000)	1.789	**	(0.021)
Size	0.887	**	(0.010)	0.228	**	(0.015)
Headwind × Size	*-0.756*	**	*(0.026)*	*-0.114*		*(0.117)*
DQ	0.982		(0.635)	0.843		(0.690)
Earn	10.210	**	(0.023)	10.600	**	(0.022)
Ret	0.219		(0.582)	0.166		(0.676)
CFRatio	-1.031	**	(0.023)	-1.113	**	(0.023)
ACC	0.452		(0.894)	0.176		(0.960)
MTB	-0.005		(0.943)	-0.030		(0.691)
RetVol	-6.044	***	(0.008)	-5.546	**	(0.012)
EarnVol	-3.777		(0.328)	-3.876		(0.320)
NBSeg	0.393		(0.134)	0.358		(0.163)
NGSeg	-0.535	**	(0.049)	-0.528	**	(0.052)
Age	0.013	**	(0.033)	0.010		(0.118)
MA	-0.092		(0.666)	-0.148		(0.486)
SEO	-0.924		(0.480)	-0.874		(0.530)
SI	-9.311	**	(0.015)	-8.994	**	(0.019)
BigN	0.121		(0.775)	0.055		(0.898)
Analyst	-0.029	**	(0.041)	-0.033	**	(0.028)
Invest	1.211	**	(0.018)	1.190	**	(0.020)
Q2	-0.164		(0.364)	-0.192		(0.287)
Q3	-0.226		(0.381)	-0.179		(0.490)
Q4	-0.501	**	(0.025)	-0.494	**	(0.028)
Constant	-2.400	*	(0.068)	-3.276	**	(0.014)
Observations	943			943		
Year FE	NO			NO		
Cluster	FIRM			FIRM		
Pseudo R^2	0.158			0.154		
Area Under ROC Curve	0.768			0.764		

Table 8
The effect of analyst following on the association between currency headwinds and the disclosure of constant-currency growth rates
This table presents logistic regression results in which the dependent variable is *Disc*, an indicator variable that measures the disclosure of constant-currency revenue growth rates. *Analyst* is split at the median in column (1), and is a continuous variable in column (2). The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) Median			(2) Continuous		
Headwind	1.026	***	(0.000)	0.819	***	(0.000)
Analyst	0.133		(0.657)	-0.038	**	(0.039)
Headwind × Analyst	*-0.230*		*(0.255)*	*0.013*		*(0.730)*
DQ	0.745		(0.728)	0.817		(0.700)
Earn	10.100	**	(0.026)	10.600	**	(0.022)
Ret	0.196		(0.628)	0.133		(0.740)
CFRatio	-1.163	**	(0.021)	-1.114	**	(0.019)
ACC	-0.333		(0.921)	0.102		(0.977)
Size	0.100		(0.214)	0.179	**	(0.037)
MTB	-0.030		(0.698)	-0.033		(0.666)
RetVol	-5.973	***	(0.007)	-5.313	**	(0.014)
EarnVol	-4.121		(0.333)	-3.830		(0.336)
NBSeg	0.465	*	(0.072)	0.374		(0.148)
NGSeg	-0.543	**	(0.048)	-0.536	**	(0.050)
Age	0.008		(0.193)	0.011	*	(0.094)
MA	-0.158		(0.458)	-0.156		(0.466)
SEO	-0.874		(0.514)	-0.896		(0.529)
SI	-8.034	**	(0.028)	-8.812	**	(0.022)
BigN	0.021		(0.961)	0.002		(0.995)
Invest	1.138	**	(0.028)	1.139	**	(0.026)
Q2	-0.231		(0.198)	-0.212		(0.237)
Q3	-0.206		(0.421)	-0.216		(0.402)
Q4	-0.474	**	(0.030)	-0.502	**	(0.025)
Constant	-2.437	*	(0.060)	-2.783	**	(0.029)
Observations	943			943		
Year FE	NO			NO		
Cluster	FIRM			FIRM		
Pseudo R^2	0.146			0.153		
Area Under ROC Curve	0.758			0.762		

Table 9
The effect of institutional investor ownership on the association between currency headwinds and the disclosure of constant-currency growth rates
This table presents logistic regression results in which the dependent variable is *Disc*, an indicator variable that measures the disclosure of constant-currency revenue growth rates. *Invest* is split at the median in column (1), and is a continuous variable in column (2). The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) Median			(2) Continuous		
Headwind	1.148	***	(0.000)	2.477	***	(0.000)
Invest	0.664	**	(0.017)	2.166	***	(0.002)
Headwind × Invest	*-0.434*		*(0.117)*	*-2.096*	***	*(0.009)*
DQ	1.189		(0.575)	0.691		(0.747)
Earn	10.500	**	(0.018)	11.390	**	(0.016)
Ret	0.141		(0.719)	0.178		(0.648)
CFRatio	-1.118	**	(0.022)	-1.204	**	(0.034)
ACC	0.165		(0.962)	-0.128		(0.973)
Size	0.202	**	(0.017)	0.204	**	(0.021)
MTB	-0.043		(0.564)	-0.043		(0.578)
RetVol	-5.138	**	(0.015)	-4.984	**	(0.019)
EarnVol	-4.013		(0.323)	-3.644		(0.359)
NBSeg	0.364		(0.158)	0.400		(0.126)
NGSeg	-0.564	**	(0.040)	-0.576	**	(0.036)
Age	0.011	*	(0.088)	0.010	*	(0.099)
MA	-0.144		(0.502)	-0.169		(0.436)
SEO	-0.996		(0.519)	-1.026		(0.503)
SI	-8.675	**	(0.020)	-9.082	**	(0.018)
BigN	0.031		(0.937)	0.018		(0.964)
Analyst	-0.033	**	(0.030)	-0.033	**	(0.029)
Q2	-0.246		(0.172)	-0.232		(0.194)
Q3	-0.214		(0.400)	-0.203		(0.429)
Q4	-0.504	**	(0.024)	-0.513	**	(0.023)
Constant	-2.722	**	(0.029)	-3.730	***	(0.006)
Observations	943			943		
Year FE	NO			NO		
Cluster	FIRM			FIRM		
Pseudo R^2	0.152			0.159		
Area Under ROC Curve	0.761			0.768		

midpoint of my sample period and it allows me to have sufficient variation in observations in both the early and late group. I find a positive and significant coefficient on *Headwind* (p-value ≤ 0.01) and an insignificant coefficient on *Headwind* × *Late* (p-value > 0.10). Taken together, the results in Table 10 suggest that there is no time effect that affects the likelihood of the strategic disclosure of constant-currency growth rates.

5. Headwind-Tailwind Paired Sample Analysis

5.1. Introduction

To provide additional evidence for my hypothesis, I follow Curtis et al. (2014) and collect additional data in the form of headwind-tailwind pairs. I begin with the same 6,946 observations considered for hand collection from my initial sample. I then identify all headwind-tailwind pairs from the same firm for which the tailwind observation is in the four quarters before or the four quarters after the headwind observation. This results in 2,168 headwind-tailwind pairs. However, there are many headwind (tailwind) observations that pair with more than one tailwind (headwind) observation.[22] In order to have exclusive pairs, for each headwind I keep only the closest tailwind. When a headwind has two tailwinds that are equally close, I keep the tailwind that occurs after the headwind.[23] I then perform the same procedure for the tailwinds that match with multiple headwinds. This results in a sample of 673 headwind-tailwind pairs, which I refer to as the paired sample. In addition, I create a subset of this sample by keeping only the observations where the tailwind occurs after the headwind. This results in 299 headwind-tailwind pairs, which I refer to as the trailing tailwind paired sample. I hand collect disclosure information following the same procedure as for my main sample.

[22] There are only 91 headwind-tailwind pairs where both the headwind and the tailwind have no other matches.
[23] Observing disclosure choice when a firm goes from a currency headwind to a currency tailwind is of greater interest.

Table 10
The effect of time on the association between currency headwinds and the disclosure of constant-currency growth rates
This table presents logistic regression results in which the dependent variable is *Disc*, an indicator variable that measures the disclosure of constant-currency revenue growth rates. In column (1), the sample is restricted to observations from the years 2005 through 2011 and year fixed effects are included in the model. Column (2) uses the full sample and includes *Late*, an indicator variable equal to one if the year is 2010 or later. The sample is constructed as disclosed in Table 1 and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) 2005-2011			(2) Early / Late		
Headwind	*0.796*	**	*(0.015)*	*0.957*	***	*(0.000)*
Late				0.126		(0.665)
Headwind × Late				-0.171		(0.666)
DQ	-1.406		(0.608)	0.767		(0.720)
Earn	2.603		(0.760)	10.510	**	(0.022)
Ret	0.161		(0.767)	0.182		(0.649)
CFRatio	-1.853	*	(0.055)	-1.124	**	(0.018)
ACC	-0.801		(0.856)	-0.015		(0.997)
Size	0.192	*	(0.086)	0.177	**	(0.039)
MTB	0.162		(0.250)	-0.030		(0.694)
RetVol	-10.030	***	(0.005)	-5.557	**	(0.016)
EarnVol	1.802		(0.690)	-3.839		(0.339)
NBSeg	0.750	**	(0.021)	0.374		(0.146)
NGSeg	-0.512		(0.137)	-0.544	*	(0.051)
Age	0.002		(0.792)	0.010		(0.109)
MA	-0.291		(0.304)	-0.153		(0.474)
SEO	-0.249		(0.858)	-0.925		(0.509)
SI	-1.154		(0.807)	-8.678	**	(0.025)
BigN	0.230		(0.698)	0.016		(0.970)
Analyst	-0.049	**	(0.018)	-0.033	**	(0.030)
Invest	1.429	**	(0.025)	1.134	**	(0.030)
Q2	0.340		(0.240)	-0.220		(0.238)
Q3	0.085		(0.830)	-0.223		(0.410)
Q4	-0.265		(0.433)	-0.499	**	(0.026)
Constant	-3.573		(0.115)	-2.766	**	(0.031)
Observations	487			943		
Year FE	YES			NO		
Cluster	FIRM			FIRM		
Pseudo R^2	0.146			0.152		
Area Under ROC Curve	0.756			0.763		

5.2. Descriptive Statistics

Table 11, Panels A and B present descriptive statistics for the paired samples. Overall, both samples appear similar to my primary sample. In addition, Table 11, Panel C shows that the paired sample and trailing tailwind paired sample are similar. However, observations in the trailing tailwind paired sample have larger foreign currency impacts (*Magnitude*), lower percent of total revenue from foreign segments (*ForeignToTotal*), higher stock returns (*Ret*), higher stock return volatility (*RetVol*), and higher special items (*SI*).

Finally, in Table 11, Panel D I present a comparison of the headwind and tailwind observations for both of the paired samples. Because each headwind is paired with a tailwind from the same firm, I calculate statistical significance using Student's dependent sample t-test. As expected, the rate of disclosure is higher for headwind observations using both measures of disclosure (*Disc* and *DiscNumeric*) for both samples. I also find that the mean is statistically different for a majority of the control variables in both of the samples. Specifically, for both samples headwind observations have larger foreign currency impact (*Magnitude*); and lower earnings (*Earn*), stock returns (*Ret*), cash flow from operations (*CFRatio*), market value of equity (*Size*), market-to-book ratio (*MTB*), special items (*SI*), analyst coverage (*Analyst*), and institutional investors (*Invest*). Headwinds in the paired sample have a larger percent of revenue from foreign segments (*ForeignToTotal*), larger percent of revenue where BUXX is used (*BUXXToTotal*), lower disaggregation quality (*DQ*), lower accruals (*ACC*), higher earnings and stock return volatility (*EarnVol* and *RetVol*, respectively), higher firm age (*Age*), and lower mergers and acquisition activity (*MA*). Lastly, headwinds in the trailing tailwinds paired sample have a lower number of geographic segments (*NGSeg*), and lower firm age (*Age*).

Table 11
Descriptive statistics for the paired samples
This table presents descriptive statistics for the paired samples observations. Panel A and Panel B present basic descriptive statistics for the paired sample and the trailing tailwinds paired sample, respectively. Panel C compares the mean of the variables of the two paired samples using Welch's t-test. Panel D provides descriptive statistics for headwinds and tailwinds for each of the two paired samples. The paired t-test compares the mean of the variables using Student's dependent sample t-test. The samples are constructed as disclosed in the text and variable definitions are provided in Appendix B.

Panel A: Paired sample basic descriptive statistics

Variable	N	Mean	SD	25%	Median	75%
Disc	1,346	0.314	0.464	0	0	1
DiscNumeric	1,346	0.397	0.490	0	0	1
Headwind	1,346	0.500	0.500	0	0.5	1
Magnitude	1,346	0.070	0.018	0.057	0.066	0.079
ForeignToTotal	1,346	0.632	0.152	0.508	0.622	0.737
BUXXToTotal	1,346	0.448	0.218	0.291	0.463	0.572
BUXXToForeign	1,346	0.727	0.318	0.481	0.864	1.000
Control Variables						
DQ	1,346	0.623	0.065	0.585	0.629	0.669
Earn	1,346	0.002	0.054	-0.002	0.012	0.024
Ret	1,346	-0.039	0.285	-0.206	-0.042	0.117
CFRatio	1,346	0.140	0.284	0.024	0.119	0.228
ACC	1,346	-0.023	0.073	-0.033	-0.014	0.000
Size	1,346	1,300.2	7.4	309.3	1,312.9	4,709.7
MTB	1,346	1.765	1.125	1.106	1.432	2.039
RetVol	1,346	0.137	0.075	0.089	0.122	0.164
EarnVol	1,346	0.027	0.039	0.007	0.014	0.030
NBSeg	1,346	3.696	1.681	2	4	6
NGSeg	1,346	5.513	1.470	4	5	7
Age	1,346	24.815	19.307	11.175	18.723	36.027
MA	1,346	0.227	0.419	0	0	0
SEO	1,346	0.017	0.151	0	0	0
SI	1,346	-0.010	0.060	-0.004	0.000	0.000
BigN	1,346	0.880	0.325	1	1	1
Analyst	1,346	5.374	7.361	0	2	8
Invest	1,346	0.748	0.227	0.638	0.793	0.898

Table 11 (Cont.)

Panel B: Trailing tailwind paired sample basic descriptive statistics

Variable	N	Mean	SD	25%	Median	75%
Disc	598	0.341	0.474	0	0	1
DiscNumeric	598	0.423	0.494	0	0	1
Headwind	598	0.500	0.500	0	0.5	1
Magnitude	598	0.075	0.021	0.060	0.070	0.084
ForeignToTotal	598	0.610	0.145	0.497	0.588	0.698
BUXXToTotal	598	0.438	0.212	0.281	0.463	0.564
BUXXToForeign	598	0.733	0.320	0.511	0.897	1.000
Control Variables						
DQ	598	0.626	0.067	0.588	0.631	0.675
Earn	598	0.005	0.050	-0.001	0.012	0.023
Ret	598	0.010	0.254	-0.127	0.022	0.131
CFRatio	598	0.147	0.311	0.025	0.127	0.238
ACC	598	-0.017	0.043	-0.032	-0.016	0.001
Size	598	1,493.8	7.4	343.8	1,479.0	5,401.8
MTB	598	1.799	1.133	1.138	1.453	2.058
RetVol	598	0.152	0.091	0.095	0.131	0.178
EarnVol	598	0.027	0.040	0.007	0.015	0.029
NBSeg	598	3.810	1.685	2	4	6
NGSeg	598	5.445	1.464	4	5	7
Age	598	25.695	19.767	11.679	18.767	36.277
MA	598	0.217	0.413	0	0	0
SEO	598	0.022	0.177	0	0	0
SI	598	-0.005	0.017	-0.004	-0.001	0.000
BigN	598	0.893	0.309	1	1	1
Analyst	598	5.535	7.283	0	2	9
Invest	598	0.746	0.213	0.644	0.790	0.891

Table 11 (Cont.)

Panel C: Descriptive statistics comparing the paired samples

	Paired Sample (n = 1,346)		Trailing Tailwind Paired Sample (n = 598)		t-test (p-value)
Variable	**Mean**	**Median**	**Mean**	**Median**	**Mean**
Disc	0.314	0	0.341	0	0.229
DiscNumeric	0.397	0	0.423	0	0.289
Headwind	0.500	0.500	0.500	0.500	1.000
Magnitude	0.070	0.066	0.075	0.070	0.000***
ForeignToTotal	0.632	0.622	0.610	0.588	0.003***
BUXXToTotal	0.448	0.463	0.438	0.463	0.316
BUXXToForeign	0.727	0.864	0.733	0.897	0.711
Control Variables					
DQ	0.623	0.629	0.626	0.631	0.405
Earn	0.002	0.012	0.005	0.012	0.213
Ret	-0.039	-0.042	0.010	0.022	0.000***
CFRatio	0.140	0.119	0.147	0.127	0.595
ACC	-0.023	-0.014	-0.017	-0.016	0.095*
Size	1,299.8	1,312.9	1,493.7	1,478.8	0.158
MTB	1.765	1.432	1.799	1.453	0.535
RetVol	0.137	0.122	0.152	0.131	0.000***
EarnVol	0.027	0.014	0.027	0.015	0.949
NBSeg	3.695	4	3.811	4	0.234
NGSeg	5.512	5	5.447	5	0.511
Age	24.815	18.723	25.695	18.767	0.357
MA	0.227	0	0.217	0	0.653
SEO	0.017	0	0.022	0	0.553
SI	-0.010	0.000	-0.005	-0.001	0.033**
BigN	0.880	1	0.893	1	0.398
Analyst	5.374	2	5.535	2	0.656
Invest	0.748	0.793	0.746	0.790	0.863

Table 11 (Cont.)

Panel D: Descriptive statistics comparing headwinds and tailwinds for the paired samples

	Paired Sample					Trailing Tailwind Paired Sample				
	Headwinds (n = 673)		Tailwinds (n = 673)		Paired t-test (p-value)	Headwinds (n = 299)		Tailwinds (n = 299)		Paired t-test (p-value)
Variable	Mean	Median	Mean	Median	Mean	Mean	Median	Mean	Median	Mean
Disc	0.336	0	0.291	0	0.000***	0.365	0	0.318	0	0.016**
DiscNumeric	0.426	0	0.368	0	0.000***	0.458	0	0.388	0	0.001***
Headwind	1.000	1	0.000	0	0.000***	1.000	1	0.000	0	0.000***
Magnitude	0.072	0.066	0.069	0.065	0.000***	0.080	0.075	0.070	0.065	0.000***
ForeignToTotal	0.635	0.623	0.629	0.621	0.000***	0.609	0.588	0.611	0.589	0.379
BUXXToTotal	0.451	0.465	0.446	0.461	0.010***	0.438	0.463	0.437	0.463	0.474
BUXXToForeign	0.728	0.863	0.726	0.865	0.441	0.734	0.897	0.732	0.897	0.178
Control Variables										
DQ	0.621	0.629	0.625	0.630	0.010***	0.625	0.631	0.627	0.630	0.473
Earn	-0.008	0.008	0.012	0.015	0.000***	-0.002	0.008	0.013	0.014	0.000***
Ret	-0.099	-0.114	0.021	0.016	0.000***	-0.048	-0.078	0.068	0.057	0.000***
CFRatio	0.121	0.103	0.158	0.131	0.000***	0.110	0.073	0.185	0.155	0.000***
ACC	-0.031	-0.016	-0.014	-0.013	0.000***	-0.016	-0.012	-0.019	-0.020	0.476
Size	1,027.6	1,024.5	1,645.8	1,775.8	0.000***	1,183.2	1,089.0	1,885.6	1,990.2	0.000***
MTB	1.567	1.294	1.963	1.574	0.000***	1.643	1.321	1.956	1.578	0.000***
RetVol	0.151	0.140	0.123	0.105	0.000***	0.154	0.140	0.149	0.122	0.204
EarnVol	0.030	0.015	0.025	0.012	0.000***	0.028	0.015	0.027	0.014	0.271
NBSeg	3.691	4	3.702	4	0.316	3.804	4	3.815	4	0.377
NGSeg	5.523	5	5.501	5	0.101	5.430	5	5.458	5	0.017**
Age	24.841	18.767	24.790	18.433	0.077*	25.316	18.679	26.075	19.433	0.000***
MA	0.201	0	0.253	0	0.012**	0.204	0	0.231	0	0.366
SEO	0.019	0	0.015	0	0.532	0.023	0	0.02	0	0.764
SI	-0.017	-0.001	-0.003	0.000	0.000***	-0.006	-0.001	-0.003	0.000	0.021**
BigN	0.881	1	0.878	1	0.318	0.893	1	0.893	1	NA
Analyst	5.260	2	5.489	2	0.007***	5.284	2	5.786	2	0.000***
Invest	0.733	0.777	0.763	0.811	0.000***	0.737	0.778	0.755	0.800	0.000***

Table 12 presents the mean and median for the variables *ForeignToTotal*, *BUXXToTotal*, and *BUXXToForeign*, stratified by the direction of the impact of currency fluctuations on revenue (Headwind or Tailwind) as well as the disclosure of a constant-currency growth rate (Informative or Opaque). I compare the mean of the variables using Welch's t-test. I find results that are substantively similar to those from the main sample that are presented in Table 3 and discussed earlier in the paper.

Table 12
Stratified comparisons of BUXX and foreign revenue variables
This table presents the mean and median for the variables ForeignToTotal, BUXXToTotal, and BUXXToForeign, stratified by the direction of the impact of currency fluctuations on revenue (Headwind or Tailwind) as well as the disclosure of a constant-currency growth rate (Informative or Opaque). Panels A and B present statistics for the paired sample, while Panels C and D present statistics for the trailing tailwind paired sample. In Panels A and C, the mean of the variables is compared between Headwind and Tailwind observations for (a) the entire sample, (b) only Informative (Disclose) observations, and (c) only Opaque observations. In Panels B and D, the mean of the variables is compared between Informative (Disclose) and Opaque observations for (a) the entire sample, (b) only Headwind observations, and (c) only Tailwind observations. Both panels compare the mean of the variables using Welch's t-test. The samples are constructed as disclosed in the text and variable definitions are provided in Appendix B.

Panel A: Paired sample comparison of headwind and tailwind observations

	Headwinds		Tailwinds		t-test (p-value)
Variable	**Mean**	**Median**	**Mean**	**Median**	**Mean**
All Observations	**(n = 673)**		**(n = 673)**		
ForeignToTotal	0.635	0.623	0.629	0.621	0.502
BUXXToTotal	0.451	0.465	0.446	0.461	0.647
BUXXToForeign	0.728	0.863	0.726	0.865	0.901
Informative (Disclose) Only	**(n = 226)**		**(n = 196)**		
ForeignToTotal	0.602	0.580	0.588	0.568	0.263
BUXXToTotal	0.446	0.463	0.444	0.461	0.879
BUXXToForeign	0.762	0.862	0.774	0.900	0.650
Opaque Only	**(n = 447)**		**(n = 477)**		
ForeignToTotal	0.651	0.640	0.646	0.632	0.614
BUXXToTotal	0.454	0.468	0.446	0.461	0.650
BUXXToForeign	0.711	0.879	0.706	0.850	0.829

Table 12 (Cont.)

Panel B: Paired sample comparison of informative (disclose) and opaque observations

Variable	Informative (Disclose) Mean	Informative (Disclose) Median	Opaque Mean	Opaque Median	t-test (p-value) Mean
All Observations	**(n = 422)**		**(n = 924)**		
ForeignToTotal	0.595	0.575	0.649	0.637	0.000***
BUXXToTotal	0.445	0.463	0.450	0.465	0.670
BUXXToForeign	0.768	0.878	0.709	0.862	0.001***
Headwinds Only	**(n = 226)**		**(n = 447)**		
ForeignToTotal	0.602	0.580	0.651	0.640	0.000***
BUXXToTotal	0.446	0.463	0.454	0.468	0.645
BUXXToForeign	0.762	0.862	0.711	0.879	0.035**
Tailwinds Only	**(n = 196)**		**(n = 477)**		
ForeignToTotal	0.588	0.568	0.646	0.632	0.000***
BUXXToTotal	0.444	0.461	0.446	0.461	0.868
BUXXToForeign	0.774	0.900	0.706	0.850	0.006***

Panel C: Trailing tailwind paired sample comparison of headwind and tailwind observations

Variable	Headwinds Mean	Headwinds Median	Tailwinds Mean	Tailwinds Median	t-test (p-value) Mean
All Observations	**(n = 299)**		**(n = 299)**		
ForeignToTotal	0.609	0.588	0.611	0.589	0.893
BUXXToTotal	0.438	0.463	0.437	0.463	0.939
BUXXToForeign	0.734	0.897	0.732	0.897	0.913
Informative (Disclose) Only	**(n = 109)**		**(n = 95)**		
ForeignToTotal	0.590	0.570	0.574	0.549	0.330
BUXXToTotal	0.451	0.467	0.454	0.467	0.923
BUXXToForeign	0.775	0.900	0.801	0.938	0.470
Opaque Only	**(n = 190)**		**(n = 204)**		
ForeignToTotal	0.620	0.594	0.628	0.607	0.622
BUXXToTotal	0.431	0.458	0.429	0.459	0.946
BUXXToForeign	0.712	0.876	0.699	0.863	0.729

Table 12 (Cont.)

Panel D: Trailing tailwind paired sample comparison of informative (disclose) and opaque observations

Variable	Informative (Disclose) Mean	Informative (Disclose) Median	Opaque Mean	Opaque Median	t-test (p-value) Mean
All Observations	**(n = 204)**		**(n = 394)**		
ForeignToTotal	0.583	0.564	0.624	0.603	0.000***
BUXXToTotal	0.452	0.467	0.430	0.458	0.173
BUXXToForeign	0.787	0.935	0.705	0.865	0.001***
Headwinds Only	**(n = 109)**		**(n = 190)**		
ForeignToTotal	0.590	0.570	0.620	0.594	0.063*
BUXXToTotal	0.451	0.467	0.431	0.458	0.384
BUXXToForeign	0.775	0.900	0.712	0.876	0.080*
Tailwinds Only	**(n = 95)**		**(n = 204)**		
ForeignToTotal	0.574	0.549	0.628	0.607	0.001***
BUXXToTotal	0.454	0.467	0.429	0.459	0.287
BUXXToForeign	0.801	0.938	0.699	0.863	0.004***

5.3. Univariate Test of Disclosure Choice in Adjacent Quarters

I follow Curtis et al. (2014) by classifying each hand-collected pair as one of four classifications. *Informative* pairs disclose in both currency headwind and currency tailwind quarters. Similarly, *Uninformative* pairs never disclose. *Opportunistic* pairs disclose when they have currency headwinds but do not disclose when they have currency tailwinds. Lastly, *Conservative* pairs disclose when they have currency tailwinds, but do not disclose when they have currency headwinds. Of the four classifications, I am most interested in *Opportunistic* pairs.

Table 13 presents contingency tables in which firm disclosure choice in headwind quarters is compared to firm disclosure choice in tailwind quarters. I use the four classifications explained above in the four quadrants of the tables. Panels A and C use *Disc* as a measure of disclosure, and Panels B and D use *DiscNumeric* as a measure of disclosure. Results for the

Table 13
Disclosure choice in adjacent quarters
This table presents contingency tables in which firm disclosure choice in headwind quarters is compared to firm disclosure choice in tailwind quarters. I include p-values from McNemar's test of marginal homogeneity in paired nominal samples. p-values are based on the binomial distribution. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Paired sample, Disc

		Headwind		
		Informative (Disclose)	**Opaque**	**Total**
Tailwind	**Informative (Disclose)**	176 26.2% Informative	20 3.0% Conservative	196 29.1%
	Opaque	50 7.4% Opportunistic	427 63.4% Uninformative	477 70.9%
	Total	226 33.6%	447 66.4%	673 100.0%

McNemar's test p-value: 0.000***

Panel B: Paired sample, DiscNumeric

		Headwind		
		Informative (Disclose)	**Opaque**	**Total**
Tailwind	**Informative (Disclose)**	233 34.6% Informative	15 2.2% Conservative	248 36.8%
	Opaque	54 8.0% Opportunistic	371 55.1% Uninformative	425 63.2%
	Total	287 42.6%	386 57.4%	673 100.0%

McNemar's test p-value: 0.000***

Table 13 (Cont.)

Panel C: Trailing tailwind paired sample, Disc

		Headwind		
		Informative (Disclose)	**Opaque**	**Total**
Tailwind	**Informative (Disclose)**	85 28.4% Informative	10 3.3% Conservative	95 31.8%
	Opaque	24 8.0% Opportunistic	180 60.2% Uninformative	204 68.2%
	Total	109 36.5%	190 63.5%	299 100.0%

McNemar's test p-value: 0.024**

Panel D: Trailing tailwind paired sample, DiscNumeric

		Headwind		
		Informative (Disclose)	**Opaque**	**Total**
Tailwind	**Informative (Disclose)**	108 36.1% Informative	8 2.7% Conservative	116 38.8%
	Opaque	29 9.7% Opportunistic	154 51.5% Uninformative	183 61.2%
	Total	137 45.8%	162 54.2%	299 100.0%

McNemar's test p-value: 0.001***

Paired Sample are presented in Panels A and B while results for the Trailing Tailwind Paired Sample are presented in Panels C and D.

Across all four panels I find that nearly 90 percent of the pairs are consistent disclosers (i.e., classified as either Informative or Uninformative). In addition, I find that more than half of the pairs do not disclose in either quarter. Thus, the panels suggest that the majority of firms do

not selectively disclose constant currency growth rates. However, a comparison of the probability of disclosure between headwind quarters and tailwind quarters is necessary to reject the hypothesis that companies are more likely to disclose in quarters with currency headwinds. The null hypothesis is marginal homogeneity, which is that the probability of disclosure is the same for both headwind and tailwind quarters:

$$p_{Informative} + p_{Opportunistic} = p_{Informative} + p_{Conservative}$$

which simplifies to:

$$p_{Opportunistic} = p_{Conservative}$$

McNemar's test is used to test for statistical significance (Agresti [2007], Agresti [2013]). The test statistic is:

$$\chi^2 = \frac{(n_{Opportunistic} - n_{Conservative})^2}{n_{Opportunistic} + n_{Conservative}}$$

with df = 1. In all four panels I find that the probability of disclosure is greater during headwind quarters than during tailwind quarters (p-values ≤ 0.05). These results suggest that, although the majority of firms are consistent in disclosure choice, firms are more likely to disclose constant-currency growth during headwind quarters than during tailwind quarters.

5.4. Main Tests

Table 14 presents the results from estimating Model (1) for the Paired Sample and the Trailing Tailwind Paired Sample. The dependent variables are *Disc* in Columns (1) and (3) and *DiscNumeric* in Columns (2) and (4). In each column, I find a positive and significant coefficient on *Headwind* (p-values ≤ 0.05). For the Paired Sample (Trailing Tailwind Paired Sample), the coefficient magnitudes suggest that, *ceteris paribus*, companies with a currency headwind are approximately 61 percent (40 percent) more likely than companies with a currency tailwind to disclose constant-currency revenue growth rates ($e^{0.477} - 1$ [$e^{0..338} - 1$]) and 63 percent (52

Table 14
The association between currency headwinds and the disclosure of constant-currency growth rates

This table presents logistic regression results for the paired samples in which the dependent variable is *Disclose*, an indicator variable that measures the disclosure of information about the effect of foreign currency fluctuations on revenue. In columns (1) and (3), the dependent variable is *Disc*, and is equal to one if a firm discloses a constant-currency revenue growth rate. In columns (2) and (4), the dependent variable is *DiscNumeric*, and is equal to one if a firm discloses either a constant-currency revenue growth rate or provides information that allows for the calculation of a constant-currency revenue growth rate. The sample is constructed as disclosed in the text and variable definitions are provided in Appendix B. p-values (in parentheses) are based on robust standard errors that are adjusted for heteroskedasticity and clustered by firm. p-values are two-tailed except for my variable of interest (italicized). ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	Paired Sample				**Trailing Tailwind Paired Sample**			
	(1)		**(2)**		**(3)**		**(4)**	
Variable	**Disc**		**DiscNumeric**		**Disc**		**DiscNumeric**	
Headwind	*0.477***	*(0.000)*	*0.491***	*(0.000)*	*0.338***	*(0.025)*	*0.418***	*(0.007)*
DQ	1.204	(0.530)	1.999	(0.279)	1.201	(0.576)	1.984	(0.344)
Earn	7.311*	(0.066)	10.440***	(0.009)	7.784	(0.103)	11.140**	(0.041)
Ret	0.131	(0.697)	-0.239	(0.433)	-0.237	(0.663)	-0.451	(0.405)
CFRatio	-0.490	(0.434)	-1.103*	(0.099)	-0.509	(0.353)	-1.012	(0.102)
ACC	-3.085	(0.411)	-5.694	(0.118)	-0.683	(0.864)	-4.624	(0.279)
Size	0.164*	(0.067)	0.131	(0.147)	0.087	(0.429)	0.091	(0.394)
MTB	-0.015	(0.879)	0.126	(0.204)	0.070	(0.523)	0.183	(0.149)
RetVol	-1.414	(0.604)	0.159	(0.932)	-0.370	(0.901)	0.691	(0.745)
EarnVol	-17.670***	(0.006)	-18.060***	(0.001)	-15.900*	(0.054)	-16.340**	(0.023)
NBSeg	0.581**	(0.029)	0.587**	(0.025)	0.547*	(0.078)	0.528*	(0.078)
NGSeg	-0.232	(0.428)	-0.296	(0.300)	-0.182	(0.567)	-0.396	(0.198)
Age	0.008	(0.200)	0.014**	(0.043)	0.010	(0.197)	0.018**	(0.022)
MA	0.126	(0.444)	0.098	(0.552)	0.428*	(0.079)	0.252	(0.316)
SEO	0.208	(0.591)	-0.216	(0.568)	-0.427	(0.521)	-0.812	(0.232)
SI	-2.888	(0.352)	-2.067	(0.475)	-11.880	(0.110)	-4.439	(0.552)
BigN	-0.090	(0.846)	-0.197	(0.622)	0.462	(0.458)	0.201	(0.712)
Analyst	-0.058***	(0.000)	-0.072***	(0.000)	-0.043**	(0.027)	-0.059***	(0.004)
Invest	0.678	(0.238)	1.000*	(0.072)	0.685	(0.327)	0.895	(0.210)
Q2	0.005	(0.971)	-0.050	(0.720)	0.163	(0.576)	-0.091	(0.746)
Q3	0.085	(0.693)	-0.072	(0.741)	0.407	(0.236)	0.217	(0.570)
Q4	-0.128	(0.409)	-0.181	(0.239)	0.058	(0.806)	-0.080	(0.735)
Constant	-3.226**	(0.029)	-3.530**	(0.011)	-3.631**	(0.047)	-3.627**	(0.030)
Observations	1,346		1,346		598		598	
Year FE	NO		NO		NO		NO	
Cluster	FIRM		FIRM		FIRM		FIRM	
Pseudo R^2	0.138		0.158		0.133		0.165	
Area Under ROC Curve	0.747		0.758		0.744		0.764	

percent) more likely to disclose either constant-currency revenue growth rates or information that allows the calculation of constant-currency revenue growth rates ($e^{0.491} - 1$ [$e^{0.418} - 1$]).

6. Conclusion

Prior research finds that managers strategically disclose earnings benchmarks by choosing the year-prior earnings adjustment that leads to the largest increase or smallest decrease in earnings (Schrand and Walther [2000], Krische [2005]). Additionally, the non-GAAP literature provides evidence that managers use non-GAAP earnings disclosures opportunistically (Black and Christensen [2009], Doyle et al. [2013], Curtis et al. [2014]). However, to my knowledge, prior research has not investigated the disclosure of non-GAAP revenue figures. In this paper, I provide the first documentation of non-GAAP revenue disclosures and investigate whether managers strategically disclose constant-currency revenue growth rates.

I find that companies with a currency headwind are more likely to disclose constant-currency revenue growth rates than companies with a currency tailwind. I find limited support for the hypothesis that the size of the currency headwind is associated with strategic disclosure. However, the design of my sample may limit my ability to adequately investigate this hypothesis. I also find some evidence suggesting that the strength of the information environment is associated with a decrease in the strategic disclosure of constant-currency revenue growth rates.

These findings are important as they confirm the suspicions of regulators that companies make strategic non-GAAP disclosures, a behavior that regulators are attempting to discourage. Additionally, my findings should be of interest to investors as they provide an example of a way in which company disclosures may be biased. Also, by using geographic segment disclosures to identify opportunistic non-GAAP disclosures, my paper provides additional evidence of the

benefits of segment reporting requirements. Finally, my results should be of interest to researchers as they provide support for academic theories that managers are likely to make strategic disclosures when the cost of extracting the statistics is high.

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8. Appendices

8.1. Appendix A: Calculating the Effect of Exchange Rate Fluctuations on Revenue Growth

The following are examples of how *FXImpact* is constructed for two actual observations.

8.1.1. Example 1: Measurement Specialties Inc. Q1 2009

This example demonstrates how *FXImpact* is constructed when the geographic segment data from the 10-K allows every segment to be tied to a specific foreign currency. I first obtain the geographic segment data from the 10-K of the fiscal year prior to the fiscal year of the quarter. In this case, for Q1 2009 the data comes from the 2008 10-K. The data, with the addition of currency codes, is shown in Figure 1.

	2008	
	$	**Currency**
United States	$107,734	USD
France	28,021	EUR
Germany	19,323	EUR
Ireland	12,969	EUR
Switzerland	4,396	CHF
China	55,940	CNY
Total	**$228,383**	

Figure 1

After the segments have been tied to a currency, I calculate the average exchange rate for the current quarter (Q1 2009) and the year-prior quarter (Q1 2008). These appear in columns (D) and (C), respectively, in Figure 2. I then calculate the percentage change between the two quarters (column (E)), and then weight the change by the proportion of total revenue (column (F)). *FXImpact* is the sum of the individual currency impacts, or 7.1% in this example. Thus, I estimate that for Measurement Specialties Inc. Q1 2009, currency exchange rate fluctuations had a positive impact on reported revenue growth. Said another way, if exchange rates had remained unchanged from the prior year, I estimate that reported revenue would be 7.1% lower.

	(A)	(B)	(C)	(D)	(E)	(F)
			Average Exchange Rate			
	$	%	Q1 2008	Q1 2009	Change	FXImpact
					(D) / (C) - 1	(B) * (E)
USD	$107,734	47.2%	1.00	1.00	–	0.0%
EUR	60,313	26.4%	1.35	1.56	15.9%	4.2%
CHF	4,396	1.9%	0.82	0.97	18.6%	0.4%
CNY	55,940	24.5%	0.13	0.14	10.4%	2.5%
Total	**$228,383**	**100.0%**				**7.1%**

Figure 2

8.1.2. Example 2: Iron Mountain Inc. Q4 2008

This example demonstrates how *FXImpact* is constructed when one or more geographic segments cannot be tied to a specific currency. As shown in Figure 3, Iron Mountain has a geographic segment, "Other International", that I cannot tie to a specific currency. As a result, I use BUXX to approximate exchange rates for this segment.

	2007	
	$	Currency
United States	$1,862,809	USD
United Kingdom	$368,008	GBP
Canada	$179,636	CAD
Other International	$319,582	BUXX
Total	**$2,730,035**	

Figure 3

The remaining steps are the same as in the prior example and appear in Figure 4. In this example, I estimate that currency exchange rate fluctuations have a negative impact on reported revenue growth. If exchange rates had remained unchanged from the prior year, I estimate that reported revenue would be 5.6% higher.

	(A)	(B)	(C)	(D)	(E)	(F)
			Average Exchange Rate			
	$	%	Q4 2007	Q4 2008	Change	Impact
					(D) / (C) - 1	(B) * (E)
USD	$1,862,809	68%	1.00	1.00	–	0.0%
GBP	368,008	13%	2.04	1.57	(23.4%)	-3.2%
CAD	179,636	7%	1.02	0.83	(19.1%)	-1.3%
BUXX	319,582	12%	1.44	1.30	(9.9%)	-1.2%
Total	**$2,730,035**	**100%**				**-5.6%**

Figure 4

8.2. Appendix B: Variable definitions

$ACC_{i,t}$:	Quarterly earnings minus cash flow from operations (for the three months ended in the current quarter) scaled by the book value of assets.
$Age_{i,t}$:	The number of years since a firm appears in CRSP's monthly file.
$Analyst_{i,t}$:	The number of analysts in the last I/B/E/S consensus forecast prior to the earnings announcement.
$BigN_{i,t}$:	An indicator variable equal to one if a firm has a Big N auditor, and zero otherwise.
$BUXXToTotal_{i,t}$:	The percent of total revenue from segments where BUXX is used in place of a specific currency.
$BUXXToForeign_{i,t}$:	The percent of foreign revenue from segments where BUXX is used in place of a specific currency.
$CFRatio_{i,t}$:	Quarterly cash flow from operations (for the three months ended in the current quarter) scaled by the book value of current liabilities.
$Disc_{i,t}$:	An indicator variable equal to one if a firm discloses a constant-currency growth rate in their earnings announcement, and zero otherwise.
$Disclose_{i,t}$:	One of two indicator variables, *Disc* or *DiscNumeric*, that measure the disclosure of information about the effect of foreign currency fluctuations on revenue.
$DiscNumeric_{i,t}$:	An indicator variable equal to one if a firm discloses either a constant-currency revenue growth rate or provides information that allows for the calculation of a constant-currency revenue growth rate, and zero otherwise.
$DQ_{i,t}$:	Disaggregation quality, a measure of the disaggregation of accounting data in the balance sheet and income statement, as measured by Chen et al. (2015).
$Earn_{i,t}$:	Quarterly earnings scaled by the book value of assets, winsorized at -3 and 3.
$EarnVol_{i,t}$:	The standard deviation of earnings (scaled by book value of assets) calculated using data from the last five years, with at least three years of data required.
$ForeignToTotal_{i,t}$:	The percent of total revenue from foreign segments.

$FXImpact_{i,t}$:	A proxy for the effect of exchange rate fluctuations on revenue growth. Please see Section 3.1 and Appendix A for calculation details.
$Headwind_{i,t}$:	An indicator variable equal to one if *FXImpact* is negative, and zero otherwise.
$Invest_{i,t}$:	The proportion of outstanding shares that are held by institutional investors in the quarterly reporting period.
$MA_{i,t}$:	An indicator variable equal to one if a firm makes a merger or acquisition in a given fiscal quarter, and zero otherwise, calculated using data from SDC Platinum.
$Magnitude_{i,t}$:	The absolute value of *FXImpact*.
$MTB_{i,t}$:	The market value of equity plus the book value of total liabilities, scaled by the book value of total assets.
$NBSeg_{i,t}$:	The logarithm of 1 plus the number of business segments.
$NGSeg_{i,t}$:	The logarithm of 1 plus the number of geographic segments.
Q2 (Q3 or Q4):	An indicator variable equal to one if the current reporting quarter is the second (third or fourth) fiscal quarter, and zero otherwise.
$Ret_{i,t}$:	Contemporaneous stock returns in the fiscal quarter, calculated using CRSP monthly return data.
$RetVol_{i,t}$:	Stock return volatility calculated using 12 months of monthly return data before the fiscal quarter ending date.
$SEO_{i,t}$:	An indicator variable equal to one if a firm has a seasoned equity offering in a fiscal quarter, and zero otherwise, calculated using data from SDC Platinum.
$SI_{i,t}$:	The amount of special items reported for the quarter, scaled by the book value of assets.
$Size_{i,t}$:	The logarithm of the market value of equity at the end of the quarter.