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Do Foreign Cash Holdings Generate Uncertainty for Market Participants?[*]

Michele Fabrizi[†], Antonio Parbonetti[‡], Elisabetta Ipino[§], Michel Magnan[**]

Résumé

S'appuyant sur un échantillon important composé de multinationales américaines durant la période 1993-2012, nous testons l'hypothèse que des liquidités trop importantes détenues à l'étranger augmentent le niveau d'incertitude parmi les intervenants sur les marchés financiers. De fait, nos résultats montrent que les liquidités détenues à l'étranger sont associées à une plus grande incertitude informationnelle auprès des analystes financiers, entraînant des anticipations de résultats plus dispersées ainsi qu'un niveau élevé de transactions anormales sur le titre. D'autres analyses montrent ces résultats sont principalement causés par les liquidités détenues dans des pays à faible croissance économique et où le différentiel entre le taux d'imposition de référence aux États-Unis et celui appliqué dans le pays est important. Globalement, nos résultats que les liquidités détenues à l'étranger ont une incidence importante sur l'asymétrie informationnelle prévalant sur les marchés financiers et permettent de comprendre l'intervention de la Securities & Exchange Commission qui encourage les entreprises à mieux divulguer leur situation en matière de liqudités.

Mots clés : encaisse (ou liquidités), prévisions d'analystes, précision des prévisions, dispersion des prévisions, réaction des marchés

Abstract

Using a large sample of U.S. multinational firms during the 1993–2012 period, we test the hypothesis that foreign cash holdings generate uncertainty among market participants. We provide evidence that cash held abroad is associated with greater information uncertainty among analysts, and causes more dispersed beliefs and abnormal trading volumes among investors. Further analyses document that these results are mainly explained by foreign cash held in countries with low economic growth and high tax difference with respect to the US. Overall, our findings shed light on the economic consequences of foreign cash holdings and offer support to the SEC's recent effort to encourage companies to increase disclosure about their cash holdings.

Keywords: Cash, Analysts' Earnings Forecasts, Forecast Accuracy, Forecast Dispersion, and Market Reaction

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1. Introduction

Cash holdings by U.S. corporations have skyrocketed in recent years. According to the U.S. Federal Reserve, non-financial corporations had $1.9 trillion in cash at the end of 2015.[1] A major portion (63%) of that cash is "trapped"[2] in foreign accounts. Recent studies show that U.S. multinational corporations (MNCs) are increasingly shifting income out of the U.S (Klassen and Laplante 2012) and that they are holding cash in foreign jurisdiction to avoid repatriation taxes (Foley et al., 2007).

The Securities and Exchange Commission (SEC) has expressed concerns about investors not obtaining enough disclosure on how much cash is held overseas and encouraged companies to report more clearly how accessible overseas cash is and how much of their cash holdings might be subject to repatriation taxes (Whitehouse, 2011). According to a J.P. Morgan Chase analyst quoted in CFO Journal, "Understanding a company's cash balances becomes more complicated when most of that cash is held abroad".[3] Moreover, in the absence of disclosure, investors are left on their own to make assumptions about how much of a company's total cash is not available to fund domestic operations (PwC, 2014). For example, analysts have urged Apple to implement a "more transparent policy around the use of cash to alleviate investor concerns" (Sacconaghi, 2010). Investment professionals interviewed by PwC (2014, p. 2) recommended "companies to disclose the cash balances held by the parent and foreign subsidiaries because this information is important in evaluating sources and uses of cash, and can be a factor that impacts a company's credit or debt rating".

In this paper, we examine whether foreign cash holdings translate into increased market

[1] Davidson, A. 2016. Why are corporations holding trillions in cash? The New York Times Magazine, January 20.
[2] Following Laplante and Nesbit (2014) we define "trapped" cash as the cash and cash equivalents held by a U.S. multinational's foreign subsidiaries that the U.S. parent is unable to use domestically without paying U.S. federal income tax.
[3] Chazan, E. 2012. At big U.S. companies, 60% of cash sits offshore: J.P. Morgan. CFO Journal, May 17. http://blogs.wsj.com/cfo/2012/05/17/at-big-u-s-companies-60-of-cash-sits-offshore-j-p-morgan/

uncertainty for key market participants, i.e., financial analysts and investors. There are at least two reasons why we expect foreign cash holdings to generate information uncertainty among market participants. First, there is uncertainty about the intended use of cash trapped abroad. Because of the repatriation tax that U.S. MNCs have to pay when they decide to bring the foreign earnings back, their investment options for cash held abroad are limited relative to cash held domestically. Klassen et al. (2014) develop a model showing that U.S. MNCs with trapped cash are likely to be firms with relatively poor foreign investment opportunities. Edwards et al. (2015) empirically show that firms with high levels of trapped cash make less profitable acquisitions of foreign target firms using cash consideration and Hanlon et al. (2015) add that the market negatively reacts to an announcement of foreign acquisition for firms with cash trapped abroad. Campbell et al. (2014) provide evidence that investors at least partially estimate the location of the cash, determine that the cash held in some countries is unlikely to be fully realized, and discount that cash accordingly.

Second, if the cash is repatriated, there is uncertainty relative to the amount of tax that the company will pay upon repatriation. Cash held in foreign subsidiaries is subjected to an additional layer of tax before it can be paid out to shareholders, thus different beliefs about changes in tax regulation create uncertainty among market participants. This source of uncertainty is likely to be exacerbated when companies hold cash in countries with high tax rate differences with respect to the U.S.

We test our hypothesis using a large sample of U.S. firms during the 1993–2012 period. To proxy for information asymmetry among financial analysts, we use the precision and dispersion of analysts' forecasts (Beuselinck et al., 2010), while to capture the information asymmetry among investors we use the trading volume reaction at the earnings announcement date compared to the price reaction (Bamber and Cheon, 1995). We measure foreign cash

following Campbell et al. (2014).

Results confirm that cash held abroad is associated with greater information uncertainty among analysts, and causes more dispersed beliefs and abnormal trading volumes among investors. Our findings are consistent with the general intuition underlying much of the theoretical trading volume research: around the announcement of new information, investors with more precise private information make smaller revisions to their expectations of the stock's value than less-informed investors with less precise private information. The differential expected value revisions raise trading volume.

Next, we investigate the determinants of the underlying uncertainty. We show that analysts and investors face higher uncertainty when cash is trapped in countries with low economic growth or in tax havens. These results are consistent with the idea that cash held these countries is more likely to be invested sub-optimally or subject to additional taxes when returned to the U.S.

Finally, we conduct robustness tests addressing the concern that our results are driven by weak corporate governance or by international diversification. Previous studies document that corporate governance has an impact on the value of cash (Dittmar and Mahrt-Smith, 2007; Pinkowitz et al., 2006). Their rationale is that poorly governed firms are more likely to dissipate cash. However, we do not find evidence that our results are driven by poor corporate governance. Additionally, extant literature shows that international diversification is associated with less accurate analyst forecast (Duru and Reeb, 2002). To address the concern that our results capture this source of forecasting complexity we incorporate a proxy for international diversification in the analysis and show that findings still hold.

Our study contributes to the literature in the following ways. First, we contribute to the literature on the determinants of analysts' forecasts (Duru and Reeb, 2002; Brown et al., 1985).

We provide evidence that foreign cash holdings increase the complexity of the forecasting task and lead to more disperse and less accurate forecasts. To the best of our knowledge, this is the first study to investigate the relation between foreign cash holding and analyst forecast properties. Second, we contribute to the debate on the economic consequences of foreign cash holdings. Campbell et al. (2014) find that investors place a lower value on an incremental dollar of cash when firms have higher levels of foreign cash holdings, especially if cash is held in tax-haven countries. We add to the literature by showing that cash held abroad is associated with greater information uncertainty, thereby providing some insights as to the potential reasons behind the valuation discount. Moreover, we show that such uncertainty extends beyond repatriation tax costs and encompass the potential use of the cash as well as the country where the cash is held.

Our findings have policy implications as well. Uncertainty arising from large cash holdings that result from differences in the tax rates and regulations at the international level reinforces the need to increase disclosure with respect the firms' foreign cash holdings in a way that goes beyond current requirements (SFAS 131). Currently, although the phenomenon is widespread around the globe, only the SEC has taken actions recommending (not mandating) additional disclosure, while other regulators have not considered the issue at all. Our results show that important economic consequences are linked to the phenomenon of cash accumulation in foreign countries and provide regulators with a sound foundation on which to base further actions to require more disclosure of and transparency on the actual location of firms' cash holdings.

This paper proceeds as follows: in Section 2, we review the relevant literature and present in more detail the motivation for the hypothesis we test in this paper. In Section 3 we describe how we estimate foreign cash and our research design. In Section 4, we present the data and the results for analysts' uncertainty and investors' volume reaction compared to price reaction at the

earnings announcement date. In Section 5, we examine other possible explanations for our results and provide robustness tests. We conclude in Section 6.

2. Prior Literature and Hypothesis Development

2.1 Foreign Cash Holdings

Multinational corporations have an incentive to "park" foreign profits overseas because U.S. corporate taxes on income earned abroad are due only when earnings are repatriated. Using proprietary data, Foley et al. (2007) show that, compared to otherwise similar firms, firms facing higher repatriation taxes hold higher levels of cash abroad in affiliates that would trigger high tax costs upon repatriation. Campbell et al. (2014) investigate the economic consequences of foreign cash holdings. They develop a model that estimate firms' foreign cash holdings using financial statement and find that the value of cash is decreasing in the level of foreign cash holdings and that its value depends on the location. This effect is stronger when cash is held in tax havens, but not when cash is held in countries with uncertain business environments (i.e., greater instability and corruption, and weaker legal protections).

Some recent studies investigate how accounting for income taxes contributes to the accumulation of foreign cash abroad. Blouin et al. (2012) find that the accounting rules regarding income tax expenses create disincentives to repatriate foreign earnings to the U.S. and contribute to the accumulation of cash abroad. Graham et al. (2011) survey tax executives and find that U.S. financial accounting rules for recording the income tax expense provide incentives for multinationals to move investment to and retained earnings in foreign locations. Edwards et al. (2015) and Hanlon et al. (2015) argue that because cash is trapped abroad due to the repatriation tax, firms are more likely to use the cash to undertake value-destroying acquisitions.

Prior research also documents that disclosure (or lack thereof) of international activities by multinational companies prevents investors and analysts from properly assessing the magnitude and value of their foreign cash holdings. Studies in this area use the institutional change triggered by the adoption of SFAS 131 and find mixed and controversial results. Hope and Thomas (2008) stress that the lack of disclosure regarding in which countries earnings are generated and cash is held, reduces stakeholders' ability to monitor managers. Because risks and investment opportunities vary widely across countries, the non-disclosure of geographical earnings decreases transparency and hinders monitoring, thus leading to a decline in firm value. Hope et al. (2006) and Botosan and Stanford (2005) show that the non-disclosure of geographic earnings does not materially undermine the information environment. In contrast, Berger and Hann (2003) find that the advent of SFAS 131 triggered an increase in monitoring.

Recently, another particular disclosure about foreign operations is receiving significant interest from both the SEC and tax policy makers – permanently reinvested earnings (PRE). Blouin et al. (2014) provide evidence concerning the location and composition of PRE. They find that: a significantly higher proportion of cash held in tax havens is designated as PRE relative to cash held in non-haven jurisdictions.

2.2 Foreign cash and information uncertainty

We argue that an important and, so far, not investigated determinant of the complexity of the forecasting task is the cash held abroad. There are several sources of uncertainty potentially embedded in foreign cash balances that lead to a more complex and difficult forecasting task. A first source of uncertainty involves the use of such cash. Managers can decide to either let their cash accounts increase overseas or try to invest them. In this case, investors and analysts face uncertainty about the future profitability of investments, which are driven by tax polices rather

than growth opportunities. Anecdotal evidence corroborates this view. When Microsoft acquired Skype for $8.5 billion, the popular press suggested that a significant determinant of Microsoft's decision was that Skype had headquarters in Luxemburg, enabling Microsoft to use foreign cash trapped overseas to make the acquisition (Bleeker, 2011).[4] Edwards et al. (2015) show that managers of corporations with high levels of both permanently reinvested earnings and cash holdings are more likely to make value-destroying acquisitions of foreign target firms. Hanlon et al. (2015) reinforce these findings and add that the market reaction to an announcement of foreign acquisitions is more negative for firms with more locked-out cash. Consequently, investors and analysts who deal with firms with high levels of foreign cash have to consider the effect of potentially suboptimal investment decisions when estimating the future stream of earnings.

A second source of uncertainty relates to the different beliefs about changes in tax regulation. Indeed, the possibility of introducing new tax holidays to help multinational corporations repatriate foreign earnings is an ongoing debate in the United States (Drucker, 2010). Moreover, some firms are able to find legal ways to avoid tax repatriation costs. In 2009, Merck & Co., the second-largest pharmaceutical company in the United States, transferred more than $9 billion from abroad without paying any U.S. tax to help finance its acquisition of Schering-Plough Corp. Nonetheless, Merck is appealing a federal judge's 2009 finding that Schering-Plough owed taxes on $690 million it had previously transferred from overseas (Drucker, 2010). Therefore, the potential ability of firms to repatriate earnings on a tax-free basis even without any change in the tax regulation is another source of uncertainty that can affect financial analysts and investors. Indeed, all else being equal, high levels of foreign cash make it

[4] Bleeker (2011) went so far as to say "Microsoft made this bone-headed deal not because it was the best fit available for the company. They made the deal because it was a tax-efficient shot in the arm. If you're a Microsoft investor, this should scare you."

more difficult to estimate future earnings since it is more difficult to determine future tax expenses.

Along with the above-mentioned sources of uncertainty, holding cash in countries with fragile political or financial issues exacerbate investors and analysts' information asymmetry problems. Indeed, the U.S. has strong corporate governance relative to most other countries, thus cash located outside the U.S. is subject to greater information asymmetry than domestic cash (Campbell et al. 2014; Durnev et al., 2016). Moreover, if the company is short of domestic financial resources because most of its cash is trapped overseas, investors and analysts must try to determine which solutions managers will undertake to cope with the financial constraints. In the aftermath of the 2007-2009 financial crisis, the SEC became increasingly concerned about the liquidity consequences of holding cash abroad (Whitehouse, 2011). When most cash is held abroad, firms may be forced to forgo some positive NPV projects, thus affecting their future cash flows and earnings. Given the above discussion, we posit the following research hypothesis:

Hypothesis*:* Foreign cash holdings generate uncertainty among market participants.

3. Methodology

3.1 Foreign Cash Estimation

To estimate the cash held overseas, we follow Campbell et al. (2014). Specifically, we initially identify the countries in which a firm has material operations based on Exhibit 21 of the Form 10-K. We then regress firms' total cash holdings on the interaction between domestic assets and a vector of dummy variables equal to one if the firm reports operations in a given country and the interaction between foreign assets and the same vector of dummy variables. Finally, coefficients from this regression are used to estimate the level of foreign cash. In Appendix A we provide a detailed description of the methodology used to estimate foreign cash.

3.2. Cash Holdings and Market Uncertainty

In our investigation, we use an array of proxies for information uncertainty. All the sources of information uncertainty identified in the hypothesis development have an impact on firms' future value and most of them directly affect firms' future earnings. Our tests focus on earnings announcements because we assume that at that time, analysts and investors have new information on companies' cash balances and can estimate the amount of foreign cash. The next sections present the different proxies used in the analysis and discuss our empirical results. To maximize the power of our tests, we use different samples when using different information asymmetry proxies to include in the analysis all observations available to estimate our models.

3.3. Analysts' Perspective (Forecasts' accuracy and dispersion)

3.3.11 Research Design and Variables

In our first set of empirical analyses, we examine the uncertainty in analysts' information environment. To measure the properties of analysts' information environment, we follow prior studies and consider analysts' forecast accuracy and dispersion, where lower accuracy and higher dispersion imply more uncertainty. Accuracy (*Accuracy*) is minus the absolute value of the median earnings per share (EPS) estimated by analysts less the reported EPS standardized over the stock market price at the end of the year. Dispersion (*Dispersion*) is the standard deviation of analysts' EPS forecast estimates over the stock market price at year-end. Following prior research, we estimate the following regression model:

$$Analyst\ Uncertainty_{i,t} = \alpha_0 + \alpha_1 Cash_{i,t-1} + \alpha_2 Foreign\ Cash_{i,t-1} + \alpha_3\ SD\ Income_{i,t-1} + \alpha_4 Leverage_{i,t-1} + \alpha_5 Size_{i,t-1} + \alpha_6 MTB_{i,t-1} + \alpha_7 R\&D_{i,t-1} +$$

$$\alpha_8 ROA_{i,t-1} + \alpha_9 Loss_{i,t-1} + \alpha_{10} Analysts_{i,t} + \alpha_{11} AvgPredLag_{i,t} + \alpha_{12} Capex_{i,t-1} + \alpha_{13} Foreign\ Income_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where *Analyst Uncertainty* stands for analysts' *Accuracy* or *Dispersion*, *Cash*[5] is the ratio of worldwide cash and short-term investments to total assets and *ForeignCash* is the ratio of foreign cash to total assets. All controls are computed as follows.

SD Income is the standard deviation of the operating income over the sample period and it controls for firm's volatility; *Leverage* is the ratio of total liabilities to total assets. *Size* is the logarithm of a firm's total assets to control for firm size and its associated effects on the proprieties of analysts' information; *MTB* is the market-to-book ratio that controls for the firm's growth opportunities. *R&D* is R&D expenditures standardized by total assets; *ROA* is the ratio of operating income to total assets; *Loss* is a dummy variable equal to 1 (0) if EPS is negative (positive); *Analysts* is the logarithm of the number of analysts; *AvgPredLag* is the average number of days between the previous year's earnings announcement and an analyst's initial EPS forecast initiated within three months after the previous year's earnings announcement; *Capex* is the firm's capital expenditure standardized by total assets; *Foreign Income* is the firm's foreign income standardized by total assets. It is worth noting that all independent variables (with the exception of *Analysts* and *AvgPredLag*) are lagged one year. The coefficient α_2 tests the effect of firm's foreign cash on analysts' uncertainty, controlling for the effect of worldwide cash, thereby providing a formal test for H1. Appendix C details variables measurement.

3.3.2Data Sources and Sample

The data used in this analysis come from COMPUSTAT and I/B/E/S. The sample

[5] To alleviate the concerns about reverse causality, in all our regression models we control for the firms' worldwide amount of cash (*Cash*).

includes all firms incorporated in the United States, excluding financial and utilities firms (SIC codes 6000–6999 and 4900–4999, respectively), that report at least one material subsidiary in a foreign country in Exhibit 21 of its 10-K and have data available to calculate all variables in Equation (1) and (2). We exclude financial firms because they are required to meet certain statutory capital requirements and they also hold substantial amounts of marketable securities that are included in cash. We exclude utilities because their cash holdings are subject to regulatory supervision in many jurisdictions. For this sample, we require data on analysts' forecasts from I/B/E/S that have at least one non-stale one-year ahead analyst EPS forecast (FPE1). We define non-stale forecasts as forecasts by analysts who issue (and/or update) an FPE1 forecast within three months after the earnings announcement date and who forecasted and/or updated an FPE1 within six months before the earnings announcement date for that same firm. We also require that earnings forecasts are available from at least two analysts for each earnings announcement, to compute forecast dispersion. Information properties are based on analysts' earnings forecasts issued in the three months immediately after the prior year's earnings announcement (see Beuselinck et al., 2010). This selection process results in a sample of 9,961 firm-year observations generated from 1,757 unique firms during the sample period 1993–2012. All variables are winsorized at the 1st and 99th percentile.

3.3.3Results

Table 1 reports descriptive statistics of the variables included in Equation (1). As the table shows, the mean sample firm is large and profitable, with substantial variation in analysts' information asymmetry proxies. The mean dispersion (*Dispersion*) of 0.006 suggests that the average forecast dispersion is approximately 0.6 percent of the lagged stock price. The mean forecast accuracy (*Accuracy*) is –0.020 in the sample, suggesting that the mean difference

between analysts' forecasts and corresponding actual earnings is approximately 2.0 percent of the lagged stock price. The table indicates that firms in the sample held on average 17.8 percent of their total assets in the form of cash and the estimated *Foreign Cash* is approximately 6.7 percent of the firm's total assets. [6] The correlation between *Cash* and *Foreign Cash* is 26.5%, thus including both variables in the regression analysis does not generate concerns[7].

<< Insert Table 1 about here >>

Table 2 reports estimate results for Equation (1) with year and two-digit SIC code fixed effects. Standard errors are clustered at the firm level. In Table 2, the sign and statistical significance of the variable *Foreign Cash* provides support for our hypothesis. Specifically, the results in columns (1) and (2) of Table 2 show that after controlling for any potential effect of firms' cash holdings, higher levels of *Foreign Cash* increases analysts' uncertainty, leading to higher dispersion (0.007; $p < 0.01$) and lower accuracy (-0.024; $p < 0.01$) of earnings forecasts. Taken together, the results show that foreign cash undermines analysts' information environment, thus leading to more disperse and less accurate earnings forecasts. In columns (3) and (4) of Table 2 we report results from estimating Equation (1), controlling for *Domestic Cash* (computed as in section 3) instead of worldwide cash. The coefficient on *Foreign Cash* remains positively and significantly related to *Dispersion* (0.008; $p < 0.01$) while it is negatively and significantly related to *Accuracy* (-0.015; $p < 0.01$). Finally, in the last two columns of Table 2, we report

[6] The mean Cash of 0.178 and the mean Foreign Cash 0.067 might appear to suggest that on average about 37 percent of cash is held outside the U.S. in this sample. However, the data presented in Table 1 have been prepared for regression analyses and have been therefore winsorized at the first and 99th percentiles to control for outliers and scaled by total assets to control for size. Before making these two adjustments, we find that 52 percent of cash is held outside the U.S.

[7] Unreported variance inflation factors (VIFs) are low, suggesting that collinearity is unlikely to be a problem in interpreting the regression results.

results from estimating equation (1) including only *Foreign Cash*, thereby excluding from the model both worldwide cash and domestic cash. The coefficient on *Foreign Cash* continues to remain positively and significantly related to *Dispersion* (0.008; $p < 0.01$) while it is negatively and significantly related to *Accuracy* (-0.022; $p < 0.01$). These results are consistent with cash held abroad generating uncertainty among analysts.

<< Insert Table 2 about here >>

We further investigate the underlying sources of uncertainty embedded in foreign cash holdings. We expect uncertainty to be higher when cash is trapped in countries with low economic growth since in these countries investment opportunities are intrinsically lower. As a consequence we expect investors and analysts to face high uncertainty since managers will struggle to find good investment options for cash trapped in these countries, compared to countries in which there is plenty of investment opportunities. Moreover, prior research documents that companies that accumulate cash are more likely to engage in poor investment decisions such as sub-optimal foreign acquisitions (Edwards et al., 2015; Hanlon et al., 2015). This result may be stronger in low-growth jurisdictions, where firms face poor economic prospects. To test this conjecture, we obtain country-level data on GDP from the World Bank and we decompose *Foreign Cash* into its two subcomponents: *Foreign Cash* $_{Low\ Growth}$, which equals to the foreign cash held in countries with a yearly change in GDP below the median sample, and *Foreign Cash* $_{High\ Growth}$, which equals to the foreign cash held in countries with a change in GDP above the median sample. Untabulated results show that 28% of the foreign cash is held in subsidiaries domiciled in low-growth jurisdiction. Table 3, columns (1) and (2), report the results related to this country characteristic. Consistent with our expectations, *Foreign Cash* $_{Low\ Growth}$

translates into greater dispersion (0.008; $p < 0.10$) and lower accuracy (-0.036; $p < 0.05$), while *Foreign Cash* $_{High\ Growth}$ is not significantly associated to uncertainty. These results support the prediction that when cash is held in jurisdictions with low growth opportunities, analysts' uncertainty increases.

The second main reason why we expect foreign cash to generate uncertainty relates to differential beliefs about potential changes in tax regulation. The impact on companies of potential changes in tax regulation is arguably higher when companies hold cash in countries with large differences in the marginal tax rate with respect to the US. Indeed, if a company holds cash in countries that do not trigger tax repatriation costs, potential changes in tax regulations are not going to affect the firm. Consequently, we expect that uncertainty is mostly generated by cash trapped in tax havens. To test this conjecture, and provide further support for our hypothesis, we collect country-level data on tax rate from OEDC database. We decompose *Foreign Cash* into its two subcomponents: *Foreign Cash* $_{Low\ Tax\ Rate\ Difference}$, which equals to the foreign cash held in countries with a tax rate difference (w.r.t. the U.S.) below the median sample, and *Foreign Cash* $_{High\ Tax\ Rate\ Difference}$. Columns (3) and (4) of Table 3 show results related to this country-specific characteristic. Overall, it appears that when cash is held in jurisdictions with an high tax rate difference (w.r.t. the U.S.) analysts' uncertainty increases. Taken together, results presented in Table 3 support the idea that analysts' uncertainty due to foreign cash is mainly driven by cash trapped in tax havens and in countries with poor economic growth.

<< Insert Table 3 about here >>

3.4 Investors' Perspective (Volume reactions)

3.4.1 Variable measurement and research design

In our second set of analyses, we investigate whether foreign cash holdings generate uncertainty among investors. We search for signs of investors' uncertainty in the trading volume reaction to the earnings announcement compared with the corresponding price reaction. Beaver (1968, p. 69) analyzes the information content of earnings announcements in terms of both price and volume reactions and justifies the focus on volume reaction by claiming that "volume reflects a lack of consensus regarding the price." Indeed, because investors differ in the way they interpret the report, some time may elapse before a consensus is reached, and this generates increased trading volume. Conversely, if consensus is reached on the first transaction, a price reaction but no volume reaction would occur (Beaver, 1968). Therefore, compared with price reactions, high volume reactions can be interpreted as indication of uncertainty among individual investors.

In this vein, Kim and Verrecchia (1991a) argue that changes in price reflect the change in the aggregate market's average beliefs while trading volume is the sum of all individual investors' trades. Thus, trading volume preserves differences among individual investors that are "cancelled out" in the averaging process that determines equilibrium prices (Kim and Verrecchia, 1991a). Kim and Verrecchia (199lb) suggest that the magnitude of trading volume relative to price reaction is an increasing function of pre-disclosure information asymmetry, and this is consistent with the idea that heterogeneity in either expectations or interpretations of the earnings announcement can stimulate trading. Bamber and Cheon (1995) show empirical evidence consistent with this intuition and find that some earnings announcements generate large abnormal trading but small abnormal returns. This happens when uncertainty arises among investors. Specifically, Bamber and Cheon show that trading volume is likely to be higher than price reaction when an earnings announcement generates differential belief revisions among investors but a small average aggregate market belief revision. Therefore, we test our hypothesis by

analyzing whether foreign cash generates higher volume reactions than price reactions. Specifically, we analyze the probability of incurring a high volume reaction but a low price reaction at the earnings announcement date. We conduct our empirical analysis in the spirit of Bamber and Cheon (1995) and begin by computing abnormal trading volume by subtracting the percentage of shares traded on the NYSE from firm i's daily percentage of shares traded. The resulting daily market-adjusted trading volume for each firm (*Volume*) is cumulated a two-days period from day –1 to day 0, relative to the earnings announcement date.[8]

Next, we compute market-adjusted returns based on 25 Fama–French portfolios formed on size and book-to-market as benchmark portfolios (Fama and French, 1993). We cumulate these excess returns over the two-day event windows and, because we are interested in the magnitude rather than the direction of the price reaction, use the absolute value of the two-day cumulative excess returns (*Returns*). Following Bamber and Cheon (1995), we create a categorical variable (*Investor Uncertainty*) that classifies earnings announcements into three categories of volume–price reactions, ordered according to the magnitude of volume reaction relative to price reaction. Specifically, "Small Volume–Large Price reaction" equals 1, "Similar Volume–Price reaction" equals 2, and "Large Volume–Small Price reaction" equals 3. To do so, we classify the reaction to each earnings announcement into a price reaction decile and a trading volume reaction decile. *Similar* reactions are those for which the difference between the price and volume reaction deciles is less than or equal to 2. *Different* reactions are those for which the absolute value of the difference between the price and volume reaction deciles is 5 or more. We further classify the *Different* reactions into either the "Large Volume–Small Price reaction" or the

[8] Untabulated results show that our findings are not affected by the window period we use. Indeed, even when we use a seven-day period results are unchanged.

"Small Volume–Large Price reaction" categories[9]. The remaining observations are deleted (*Indeterminate* reactions). To test whether foreign cash generates uncertainty among investors, we estimate the following model:

$$Investor\ Uncertainty_{i,t} = \beta_0 + \beta_1 Cash_{i,t} + \beta_2 Foreign\ Cash_{i,t} + \beta_3 DISP_{i,t} + \beta_4 RANGE_{i,t} + \beta_5 NOA + \beta_6 UEDIFF_{i,t} + \beta_7 PRICEUP_{i,t} + \beta_8 MKTVAL_{i,t} + \varepsilon_{i,t} \quad (2)$$

Control variables follow the original Bamber and Cheon (1995)'s model. Specifically, *DISP* is the standard deviation of analyst forecasts, deflated by the absolute value of the mean forecast; *RANGE* is the difference between the most optimistic and most pessimistic analyst forecast; *NOA* is the number of analysts forecasting the firm's earnings; *UEDIFF* is the difference between random-walk-based unexpected earnings (the absolute percentage forecast error from a seasonal random-walk model) and analyst-based unexpected earnings (the absolute percentage forecast error of the mean analyst forecast); *PRICE UP* equals 1 if the earnings announcement is associated with rising prices and 0 otherwise; and *MKTVAL* is the market value of a firm's outstanding shares. Our research hypothesis predicts a positive and significant β_2. Appendix C details variables measurement.

4.2.2 Data and results

The data used in this analysis come from COMPUSTAT, I/B/E/S and CRSP. As in the previous analyses, the sample includes all firms incorporated in the United States, excluding financial and utilities firms (SIC codes 6000–6999 and 4900–4999, respectively), that report at least one material subsidiary in a foreign country in Exhibit 21 of its 10-K and have data

[9] For example, a decile 4 price-reaction is classified as a large volume and small price reaction if the contemporaneous volume reaction is in decile 9 or 10.

available to foreign cash as previously described. We compute variables in Equation (2) using 11,997 firm-year observations generated from 2,195 unique observations. Because we drop observations with *Indeterminate* reactions (see above), we estimate Equation (2) using 9,066 firm-year observations when we compute the dependent variable Investor Uncertainty using a two-day window.

Table 4 reports descriptive statistics of the variables used in the analysis, and Table 5 shows regression results. Year and industry fixed effects are included, and heteroskedasticity-consistent standard errors are clustered at the firm level.

<< Insert Table 4 about here >>

Descriptive statistics in Table 4 show that the sample used in this second set of analyses is similar to the sample used to estimate Equation (1) in terms of worldwide cash (mean *Cash* = 0.184) and foreign cash (mean *Foreign Cash* = 0.066).

In Table 5, we employ an ordered response logit model that incorporates information embedded in the ordering of the dependent variable and is appropriate when the dependent variable's values are categorical but of ordinal scale. The values of our dependent variable are the three categories of volume–price reactions defined previously, ordered according to the magnitude of volume reaction relative to price reaction.[10] The ordered response logit model fits the following function:

$$g(Pr(CAT<i|X))=a_i+B'X,$$

[10] Small Volume–Large Price reaction = 1, Similar Volume–Price reaction = 2, and Large Volume–Small Price reaction = 3. The "indeterminate" reactions are excluded from the logit analysis to reduce error in assigning the dependent variable to categories.

where *CAT* is the category value assumed by the dependent variable; *X* is a vector of independent variables; and $1 \leq i \leq k - 1$, with k = 3, are the numbers of values the dependent variable assumes.

This equation fits the probability that a reaction is from category *i* (or *lower*), given the observed vector of explanatory variables. Results in Table 5 provide support for our expectation and are consistent with our previous evidence. The coefficient on *Foreign Cash* is positive and statistically significant in all three regressions, indicating that foreign cash holdings are associated with the probability of being in the highest category (y = 3). In other words, firms' foreign cash is associated with significantly higher volume than price reactions. Overall, the results provide strong support for our research hypothesis.

<< Insert Table 5 about here >>

In Table 6, we further investigate our findings. We use the partitioning used in previous analyses (see Table 3 above) and we distinguish between: i) foreign cash held in high and low-growth countries and ii) foreign cash held in high and-low tax jurisdiction countries. Also in this case, we expect that market uncertainty is driven by foreign cash trapped in countries with low economic growth and countries with high tax differences with respect to the US. Results presented in Table 6 provide support for our conjecture. Specifically, investor uncertainty increases when cash is held in foreign subsidiaries with low-grow opportunities (Column 1: 0.916; $p < 0.10$) and when cash is held in jurisdictions with a large difference in tax rate (Column 2: 6.316; $p < 0.01$).

<< Insert Table 6 about here >>

5. Robustness analyses

In this section, we investigate whether corporate governance and geographical dispersion explain our results. Dittmar and Mahrt-Smith (2007) document that corporate governance has an impact on the value of cash. Their rationale is that poorly governed firms are more likely to dissipate cash. In a similar vein, Pinkowitz et al. (2006) find that the relationship between cash holdings and firm value is weaker in countries with poor investor protection than in other countries. Consequently, if firms with poor governance are more likely to keep cash abroad to avoid tax repatriation costs than well-governed firms, our results could reflect uncertainty related to firms' agency problems. To address this point, we retrieve data on firms' governance from the Risk Metrics database, which provides information to create the governance index (g-score) as proposed in Gompers et al. (2003). From 2007 onward, because of a change in the methodology to collect data, not all corporate governance provisions used in Gompers et al. (2003) are available. Therefore, to create firms' g-scores we identify a subset of 13 provisions[11] that are covered continuously in Risk Metrics during our sample period.[12] We then create a dummy variable (*GV*) that takes the value of 1 (0) if a firm's g-score is above (below) the sample median and include this variable as well as its interaction with the firm's cash holding in the regression analyses. As in Gompers et al. (2003), higher values of the governance variable indicate more provisions that restrict shareholders' power and, thus, weak corporate governance.

In Table 7, Panel A, we estimate Equations (1) and (2) controlling for the effect of corporate governance by including in the regressions the variable GV and its interactions with

[11] The provisions included are blank check, classified board, special meeting, written consent, golden parachutes, bylaws, charter, cumulative voting, secret ballot, supermajority, unequal voting, fair price, and poison pill.

[12] Because g-score data are not available for a large number of sample firms, we replace missing values with the sample average. Alternatively, we follow Hanlon et al.'s (2003) approach and introduce a G dummy set to 1 (0) if a g-score is present (absent) for the firm-year. We then interact the *G* dummy with the (continuous) g-score and introduce both variables into the regression models. The results using this alternative model specification are qualitatively similar to those reported in the paper.

foreign cash. The sign and statistical significance of the coefficients on foreign cash holdings are consistent with those reported in the main analyses and thus confirm our hypothesis. However, we do not find empirical support for the concern that agency problems due to poor corporate governance translate into higher market uncertainty.

Extant literature shows that international diversification is associated with less accurate analyst forecast (Duru and Reeb, 2002). To address the concern that our results capture this source of forecasting complexity we incorporate a proxy for international diversification in the analysis

Next, we address the concern about international diversification. Previous research provides evidence that international diversification is an autonomous source of forecast difficulty that translates into less accurate analyst earnings forecasts (Duru and Reeb, 2002). To address the concern that our results capture this source of forecasting complexity we incorporate a proxy for international diversification in the analysis. Specifically, we create a dummy variable (DV) that takes the value of 1 (0) if the number of foreign countries in which the firm operates (scaled by total assets) is higher (lower) than the sample median and include this variable as well as its interaction with firms' foreign cash holdings in the regression analyses. Results shown in Table 7, Panel B, are consistent with those reported in the main analyses and thus confirm our hypothesis.

<< Insert Table 7 here >>

6. Conclusion

Using a large sample of U.S. multinational firms during the 1993–2012 period, we show that foreign cash holdings increase market uncertainty, as reflected by a decrease in the precision of analysts' forecasts and differential belief revisions among investors. Although recent studies (Campbell et al., 2014) explore the valuation implications of holding cash abroad, extant literature has ignored the possibility that cash holdings trigger differences in beliefs among market participants. This paper aims to fill this gap by showing that firms' foreign cash generates uncertainty and trigger disagreement among investors. This aspect is particularly important because the uncertainty generated by cash held abroad is likely to be a cause of that cash's lower value.

In our first set of tests, we analyze the effect of foreign cash holdings on analysts' accuracy and dispersion. We use Campbell et al.'s (2014) measure of foreign cash that exploits information on the location of firms' material subsidiaries. Consistent with the view that foreign cash generates information uncertainty, we find a decrease in accuracy and an increase in dispersion of analysts' forecasts as foreign cash holdings increase. Second, building on the work of Bamber and Cheon (1995), we examine the differences in price and volume reactions to earnings announcements for signs of investors' disagreements over firms' expected performance and investments. We document that foreign cash is associated with abnormal trading volumes around earnings announcements and causes more dispersed beliefs among investors.

Our findings have policy implications. We show evidence that the large amount of cash accumulated in the past years because of the differences in tax rates and regulations at the international level generates uncertainty. Thus, regulators should take action to mandate that firms increase disclosure of their foreign cash holdings. Our results also show that important economic consequences are linked to the phenomenon of cash accumulation in foreign countries, and they indicate that regulators should take further actions to require more disclosure of and

transparency on the actual location of firms' cash holdings. As a consequence, our studies is also relevant for the growing body of literature on the disclosure practices of multinational corporations regarding their foreign activities (e.g., Hope and Thomas, 2008; Hope et al., 2009) and on their income repatriation decisions (Dodonova and Khoroshilov, 2007; Blouin et al., 2012). Indeed, we show that the amount of information currently available to analysts and investors is incomplete and does not provide them with a full picture of a firm's international activities.

References

Altshuler R., and Newlon, T.S. (1993). The effects of United States tax policy on the income repatriation patterns of U.S. multinational corporations. In *Studies in International Taxation*, edited by A. Giovannini, G. Hubbard, and J. Slemrod, 77-115. Chicago, IL: University of Chicago Press.

Bamber, L. S. and Cheon, Y. S. (1995). Differential price and volume reactions to accounting earnings announcements, *The Accounting Review* 70 (3), 417-441.

Beaver, W. H. (1968). The information content of annual earnings announcements, *Journal of Accounting Research* 6 (3), 67-92.

Berger, P.G., and Hann, R. (2003). The impact of SFAS No. 131 on information and monitoring, Journal of Accounting Research 41(2), 163-223.

Beuselinck, C., Joos, P., Khurana, I.K., and Van der Meulen, S. (2010). Mandatory adoption of IFRS and analysts' forecasts information properties, unpublished working paper, Tilburg University, University of Missouri-Columbia.

Bleeker, E. (2011). Microsoft's Quarter: One Big Tax Dodge. July 22, 1011. Available at http://www.dailyfinance.com.

Blouin, J. L., Krull, L. K., and Robinson, L. A. (2012). Is US multinational dividend repatriation policy influenced by reporting incentives? *The Accounting Review* 87 (5), 1463-1491.

Blouin, J.L., Krull, L.K. and Robinson, L.A. (2014). The Location, Composition, and Investment Implications of Permanently Reinvested Earnings. Available at SSRN:http://ssrn.com/abstract=2154662 or http://dx.doi.org/10.2139/ssrn.2154662

Botosan, C.A., and Stanford, M. (2005). Managers' motives to withhold segment disclosures and the effect of SFAS No. 131 on analysts' information environment, *The Accounting Review* 80 (3), 751-772.

Campbell, J.L, Dhaliwal, D.S., Krull, L.K. and Schwab, C. (2014). U.S. multinational corporations' foreign cash holdings: An empirical estimates and its valuation consequences, unpublished working paper, University of Georgia, University of Arizona, University of Oregon. Available at SSRN: http://ssrn.com/abstract=2277804 or http://dx.doi.org/10.2139/ssrn.2277804.

Chen, X. (2014). Repatriation tax and the value of cash holdings. Working paper. University of California-Irvine.

Desai, M., Foley, F. and Hines, J. (2001). Repatriation taxes and dividend distortions, *National Tax Journal* 54, 859-851.

Dittmar, A. and Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings, *Journal of Financial Economics* 83 (3), 599-634.

Dodonova, A., and Khoroshilov, Y. (2007). Income repatriation decision for multinational corporations: Tax issues, *Journal of Accounting and Public Policy* 26 (3), 376-384.

Durnev, A., Li, T. and Magnan, M. (2016). Are Offshore Companies Worth More? *Journal of Corporate Finance*. Forthcoming.

Dyreng, S. D., & Lindsey, B. P. (2009). Using financial accounting data to examine the effect of foreign operations located in tax havens and other countries on US multinational firms' tax rates. *Journal of Accounting Research*, *47*(5), 1283-1316.

Drucker, J. (2010). Dodging repatriation tax lets U.S. companies bring home cash, Bloomberg News.

Edwards, A., Kravet, T., and Wilson, R. (2015). Trapped cash and the profitability of foreign acquisitions. *Contemporary Accounting Research*.

Fama, E. F. and French, K.R. (1993). Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33 (1), 3–56.

Foley, F. C., Hartzell, J. C., Titman, S. and Twite, G. (2007). Why do firms hold so much cash? A tax-based explanation, *Journal of Financial Economics* 86 (3), 579-607.

Gompers, P.A., Metrick, A. and Ishii J.L. (2003). Corporate governance and equity prices, *The Quarterly Journal of Economics* 118 (1), 107-156.

Graham, J. R., Hanlon, M. and Shevlin, T. (2011). Real effects of accounting rules: Evidence from multinational firms' investment location and profit repatriation decisions, *Journal of Accounting Research* 49 (1), 137-185.

Grubert, H. (1998). Taxes and the division of foreign operating income among royalties, interest, dividends and retained earnings. *Journal of Public Economics* 68: 269-290.

Hail, L., and Leuz, C. (2006) International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research* 44 (3): 485-531.

Hanlon, M., Rajgopal, S. and Shevlin, T. (2003). Are executive stock options associated with future earnings? *Journal of Accounting and Economics* 36 (1-3), 3-43.

Hanlon, M., Lester, R. and Verdi, R.S. (2015). The effect of repatriation tax costs on U.S. multinational investment, *Journal of Financial Economics*, Forthcoming.

Hanlon, M., Maydew, E.L. and Saavedra, D. (2014). The Taxman Cometh: Does Tax Uncertainty Affect Corporate Cash Holdings? Available at
SSRN: http://ssrn.com/abstract=2292020 orhttp://dx.doi.org/10.2139/ssrn.2292020.

Hines, J.R., and Hubbard, R.G. (1990). Coming home to America: Dividend repatriations by U.S. multinationals. In *Taxation in the Global Economy*, edited by A. Razin, and J. Slemrod, 161- 200. Chicago, IL: University of Chicago Press.

Hodrick, L.S. (2013). Are U.S. firms really holding too much cash? Stanford Institute for Economic Policy Research. July 2013.

Hope, O.K., and Thomas, W.B. (2008). Managerial empire building and firm disclosure, *Journal of Accounting Research* 46 (3), 591-626.

Hope, O.K., Thomas, W.B., and Winterbotham, G. (2009). Geographic earnings disclosure and trading volume, *Journal of Accounting and Public Policy* 28 (3), 167-188.

Hope, O.K., Thomas, W.B., and Winterbotham, G. (2006). The impact of nondisclosure of geographic segment earnings on earnings predictability, *Journal of Accounting, Auditing & Finance* 21(3), 323-346.

Kalcheva, I., and Lins, K. V. (2007). International evidence on cash holdings and expected managerial agency problems, *Review of Financial Studies* 20 (4), 1087-1112.

Kaufmann, D., A. Kraay, and Mastruzzi M. (2011). The worldwide governance indicators: Methodology and analytical issues. World Bank working paper.

Kim, O. and Verrecchia, R. (199la). Trading volume and price reactions to public announcements, *Journal of Accounting Research* 29 (2), 302-321.

Kim, O. and Verrecchia, R. (199lb). Market reaction to anticipated announcements, *Journal of Financial Economics* 30 (2), 273-309.

Klassen, K. J., and Laplante, S. K. (2012). The effect of foreign reinvestment and financial reporting incentives on cross- jurisdictional income shifting, *Contemporary Accounting Research* 29 (3), 928-955.

Klassen, K.J., S.K. Laplante, and C. Carnaghan (2014). A Model of the Cost of Income Shifting with an Application to Tax Planning and e-Commerce. *Journal of the American Taxation Association* 36(2): 27-53.

PWC (2014). Disclosing cash held offshore. Available at: www.pwc.com

Laplante, S. and Nesbitt, W. (2015). Trapped Cash: Estimating the Likelihood that a U.S. Multinational Firm has Cash Trapped in Foreign Subsidiaries. Working Paper

Pinkowitz, L., Stulz, R. and Williamson, R. (2006). Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis, *The Journal of Finance* 61 (6), 2725-2751.

Sacconaghi, T. (2010). Apple: An Open Letter to CEO Steve Jobs and Apple's Board -Time to Return Cash to Shareholders. Berstein Research.

Schwartz, N. D., & Duhigg, C. (2013). Apple's web of tax shelters saved it billions, panel finds. *New York Times*, *20*.

Thakor, R (2013). Investment opportunities, free-cash-flow, and the market values of foreign and domestic cash holdings, unpublished working paper, Massachusetts Institute of Technology.

Whitehouse, T. (2011). SEC squinting at overseas earnings. Compliance Weekly, June 14.

Appendix A: Foreign Cash Estimation

Campbell et al. (2014) begin with the following equation:

$$\text{Cash} = \rho * \text{Total Assets} \tag{3}$$

where Cash equals worldwide cash, ρ is the firm's ratio of total cash to total assets, and Total Assets equals worldwide assets. Then, they separate domestic and foreign cash:

$$\text{Cash} = \text{Domestic Cash} + \text{Foreign Cash} \tag{4}$$

$$\text{Cash} = \rho^{DOM} * \text{Domestic Assets} + \rho^{FOR} * \text{Foreign Assets} \tag{5}$$

where *Domestic Cash* equals cash held in the U.S., *Foreign Cash* equals cash held in foreign subsidiaries, ρ^{DOM} equals the firm's ratio of domestic cash to domestic assets, ρ^{FOR} equals the firm's ratio of foreign cash to foreign assets, *Domestic Assets* equals assets held in the U.S., and *Foreign Assets* equals assets held outside the U.S. Since most firms do not report foreign and domestic assets, Campbell et al. (2014) decompose the return on assets (Net Income/Assets) into the product of the profit margin (Net Income/Sales) and the asset turnover ratio (Sales/Assets). By assuming the asset turnover ratio is the same for domestic and foreign operations, it is possible to use foreign sales (which is reported by most multinational firms) to solve for foreign assets. Domestic assets are then estimated as consolidated assets minus foreign assets[13].

As explained in Campbell et al. (2014), a firm's ratio of foreign cash to foreign assets is expected to vary according to the countries in which it operates. Therefore, it is possible to estimate ρ^{FOR} as follows:

$$\rho^{FOR} = \Sigma \delta_k * \text{Country}_k \tag{6}$$

where Country_k equals a vector of dummy variables equal to one if the firm has a material subsidiary in Country k and δ_k equals the ratio of cash in country k to foreign assets. Because

[13] Campbell at al. (2014) measure of foreign cash shows a correlation of 70% with the total foreign cash figures obtained from Bureau of Economic Analysis (BEA)'s *Survey of U.S. Direct Investment Abroad.* Refer to Campbell et al. (2014) for a full description of the methodology used to estimate foreign cash and for the validation procedure of the measure.

Campbell et al. (2014) use worldwide cash to estimate the location of cash, and a firm's foreign activity can affect the cash it holds in the United States, they estimate ρ^{DOM} as follows:

$$\rho^{DOM} = \Sigma\gamma_k * \text{Country}_k \quad (7)$$

Where γ_k equals the ratio of domestic cash associated with country k to domestic assets. By substituting Equations (6) and (7) into Equation (5), the following equation is obtained:

$$\text{Cash}_{i,t} = \Sigma\gamma_k \text{Domestic Assets}_{i,t} * \text{Country}_{k,i,t} + \Sigma\delta_k \text{Foreign Assets}_{i,t} * \text{Country}_{k,i,t} \quad (8)$$

As in Campbell et al. (2014), it is necessary to add an error term to (6) and allow the vector Country_k to include each of the 39 countries studied by Hail and Leuz (2006). Because many tax havens are countries outside of the Hail and Leuz (2006) 39 countries, as in Campbell et al. (2014), we also include $\text{OtherHaven}_{i,t}$ which equals one if firm i reports a material subsidiary in any of an additional 40 tax haven countries listed in Dyreng and Lindsey (2009) in year t (zero otherwise). Finally, Campbell et al. (2014) include $\text{OtherNon-Haven}_{i,t}$ which equals one if firm i reports a material subsidiary in any of the remaining 138 countries covered by the World Bank in year t (zero otherwise). These adjustments allow us to estimate the following regression equation using OLS:

$$\begin{aligned} Cash_{i,t} = & \sum_{k=1}^{39} \alpha_k Domestic\ Assets_{i,t} * Country_{k,i,t} + \alpha_{40} Domestic\ Assets_{i,t} \\ & * Other\ Haven_{i,t} + \alpha_{41} Domestic\ Assets_{i,t} * Other\ NonHaven_{i,t} \\ & + \sum_{k=1}^{39} \beta_k\ Foreign\ Assets_{i,t} * Country_{k,i,t} + \beta_{40}\ Foreign\ Assets_{i,t} \\ & * Other\ Haven_{i,t} + \beta_{41} Foreign\ Assets_{i,t} * Other\ NonHaven_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (9)$$

As in Campbell et al. (2014), we divide Cash, Domestic Assets, and Foreign Assets by worldwide assets to control for heteroskedasticity. Each α_k in Equation (9) represents the average increase in cash per dollar of domestic assets for firms with a material subsidiary in country k. We use these coefficients to estimate the amount of cash associated with U.S. operations by aggregating the impact of firm i's material foreign operations on domestic cash. Specifically, firm i's ratio of domestic cash to total assets equals $DomesticAssets_{i,t}*[\Sigma(\alpha_k*Country_{k,i,t}) + \alpha_{40}*OtherHaven_{i,t} + \alpha_{41}*OtherNonHaven_{i,t}]$. To estimate domestic cash for firm i in year t, we multiply this ratio by total assets.

Similarly, each β_k in Equation (9) represents the average increase in cash per dollar of foreign assets for firms with a material subsidiary in country k. We use these coefficients to estimate the amount of cash associated with operations in each country and assume the increase in cash for firms with material subsidiaries in country k is held in country k. Specifically, $\beta_k*ForeignAssets_{i,t}*Country_{k,i,t}$ provides an estimate of firm i's ratio of foreign cash in country k to total assets. To estimate firm i's ratio of total foreign cash to total assets we sum across all countries: $ForeignAssets_{i,t} * [\Sigma(\beta_k*Country_{k,i,t}) + \beta_{40}*OtherHaven_{i,t} + \beta_{41}*OtherNonHaven_{i,t}]$. While the regression results in one β_k per country, our estimates of foreign cash are firm-specific because each firm operates in a distinct set of countries and has a distinct level of Foreign Assets. Data on the location of foreign subsidiaries are obtained from Scott Dyreng that collected these data for the period 1993-2009. We extend this database by collecting information on firms' foreign subsidiaries from the 10-K file for the years 2010-2012. [14] In Appendix B we present the

[14] Untabulated results show that when we extend the sample to 2012, domestic cash and foreign cash measures correlate at 98% with the ones presented in Campbell et al. (2014) sample period. Moreover, Campbell et al. (2014) validate their measure by comparing the estimated values of foreign cash holdings with private data obtained from the U.S. Bureau of Economic Analysis.

coefficients from estimating equation (9), which forms the basis of our foreign cash estimates.[15]

[15] Note that many coefficients are negative. Although negative foreign coefficients are not necessarily problematic if they are simply interpreted as lower levels of cash in those countries (relative to countries with positive foreign coefficients), a negative cash balance in a country is not intuitive. For ease of interpretation, we rescale these coefficient estimates in a way that prevents negative cash balances in any particular country but also maintains the distribution of each firm's total foreign cash estimates. We follow Campbell et al. and we estimate cash using the following steps: (1) compute the sum of total foreign cash based on the raw coefficients used in Table 2 (winsorizing at zero and the amount of worldwide cash), (2) normalize the coefficients as in "estimate 3" and use these coefficients to estimate cash for each country-firm-year, (3) compute the firm-year sum of total foreign cash using these normalized coefficients (from step 2), (4) calculate the ratio of a firm's cash in a specific country (computed in step 2) to its total foreign cash (computed in step 3), and (5) multiply this ratio (from step 4) by the sum of total foreign cash (from step 1).

Appendix B. Coefficients used to estimate foreign cash

	Domestic Coefficients	***Foreign Coefficients***
ARGENTINA	-0.021	-0.015
AUSTRALIA	0.025	0.005
AUSTRIA	-0.020	-0.043
BELGIUM	-0.024	-0.037
BRAZIL	-0.018	-0.052
CANADA	0.056	-0.016
CHILE	-0.043	0.030
DENMARK	-0.021	-0.003
EGYPT	-0.018	-0.004
FINALND	-0.014	-0.003
FRANCE	0.041	0.015
GERMANY	0.047	0.061
GREECE	0.011	-0.021
HONG KONG	0.003	0.057
INDIA	0.055	0.014
INDONESIA	-0.024	-0.047
IRELAND	0.001	0.016
ISRAEL	0.073	0.069
ITALY	-0.037	-0.042
JAPAN	0.050	0.094
SOUTH KOREA	0.024	0.017
MALAYSIA	-0.039	0.004
MEXICO	-0.017	-0.069
THE NETHERLAND	0.010	0.017
NEW ZELAND	-0.026	0.000
NORWAY	0.042	-0.097
PAKINSTAN	-0.027	0.000
PERU	0.014	-0.001
PHILIPPINE	-0.030	0.012
PORTUGAL	-0.028	0.035
SINGAPORE	0.008	0.052
SOUTH AFRICA	-0.012	-0.015
SPAIN	-0.062	-0.006
SRI LANKA	0.003	0.013
SWEDEN	0.026	-0.014
SWIZZERLAND	0.003	-0.007
TAIWAN	-0.011	-0.021
THAILAND	-0.035	-0.060
UNITED KINDOM	0.106	0.051

	Domestic Cash	***Foreign Cash***
Other Heaven	0.007	0.085
Other Non-Heaven	-0.013	0.109

This table presents the coefficient estimates from estimating Equation (7). The column labeled *Domestic Cash* reports coefficients on each interaction term that includes Domestic Assets, while the column labeled *Foreign Cash* reports coefficients on each interaction term that includes Foreign Assets. These coefficients are used as in Campbell et al. (2014) to estimate firms' foreign cash holdings.

Appendix C. Variable Definition

Main Research Variables

Cash	Worldwide cash (Compustat item "che") over total assets
Foreign Cash	Estimated foreign cash over total assets
Domestic Cash	Domestic cash holdings over total assets, or the difference between Cash and Foreign Cash
Foreign Cash $_{\text{Low GDP growth}}$	Estimated foreign cash held in countries with low GDP growth (scaled by total assets)
Foreign Cash $_{\text{High GDP growth}}$	Estimated foreign cash held in countries with high GDP growth (scaled by total assets)
Foreign Cash $_{\text{Low TAX difference}}$	Estimated foreign cash held in countries with low TAX difference with respect to the US (scaled by total assets)
Foreign Cash $_{\text{High TAX difference}}$	Estimated foreign cash held in countries with high TAX difference with respect to the US (scaled by total assets)

Uncertainty measures

Dispersion	Standard deviation of analysts' EPS forecast estimates over the stock market price at year end
Accuracy	Minus the absolute value of the median EPS estimated by analysts less the reported EPS standardized over the stock market price at the end of the year
Investor Uncertainty	Categorical variable that classifies earnings announcements into three categories of volume–price reactions, ordered according to the magnitude of volume reaction relative to price reaction computed over a 2-day window as in Bamber and Cheon (1995). Small Volume–Large Price reaction = 1, Similar Volume–Price reaction = 2, and Large Volume–Small Price reaction = 3

Control variables

SD Income	Standard deviation of the operating income over the sample period
Leverage	Total liabilities over total assets
Size	Logarithm of a firm's total assets
MTB	Market-to-book ratio;
R&D	R&D expenditures over total assets
ROA	Operating income over total assets
Loss	Dummy variable that equals 1 if EPS is negative, 0 otherwise

Analysts	Logarithm of the number of analysts following the firm
AvgPredLag	Average number of days between previous year's earnings announcement and an analyst's initial EPS forecast initiated within 3 months after previous year's earnings announcement
Capex	Capital expenditure over total assets
Foreign Income	Foreign income over total assets
DIPS	Standard deviation of the analyst forecasts, deflated by the absolute value of the mean forecast
RANGE	Difference between the most optimistic and most pessimistic analyst forecast
NOA	Number of analysts forecasting a firm's earnings
UEDIFF	Difference between random-walk-based unexpected earnings (the absolute percentage forecast error from a seasonal random-walk model) and analyst-based unexpected earnings (the absolute percentage forecast error of the mean analyst forecast)
PRICE UP	Dummy variable that equals 1 if the earnings announcement is associated with rising prices, 0 otherwise
MKTVALUE	Market value of the firm's outstanding shares

Table 1. Foreign cash and analysts' forecasts: Descriptive statistics

	Obs.	**Mean**	**Std. Dev.**	**p25**	**p50**	**p75**
Dispersion	9,961	0.006	0.012	0.001	0.002	0.006
Accuracy	9,961	-0.020	0.048	-0.016	-0.005	-0.002
Cash	9,961	0.178	0.179	0.037	0.112	0.267
Foreign Cash	9,961	0.067	0.073	0.010	0.045	0.098
Domestic Cash	9,961	0.123	0.161	0.000	0.053	0.186
SD Income	9,961	0.078	0.076	0.036	0.055	0.090
Leverage	9,961	0.490	0.214	0.329	0.492	0.632
Size	9,961	7.375	1.556	6.250	7.285	8.403
MTB	9,961	3.427	3.552	1.642	2.491	3.984
R&D	9,961	0.045	0.060	0.000	0.019	0.070
ROA	9,961	0.096	0.094	0.054	0.097	0.146
Loss	9,961	0.098	0.297	0.000	0.000	0.000
Analysts	9,961	1.875	0.689	1.386	1.946	2.398
AvgPredLag	9,961	20.377	16.372	7.250	17.100	29.813
Capex	9,961	0.051	0.045	0.021	0.037	0.064
Foreign Income	9,961	0.026	0.041	0.000	0.014	0.044

The table provides descriptive statistics for the variables included in Equation (8). Variables are defined in Appendix C.

Table 2. Foreign cash and analysts' forecasts: Regression results

	(1)	(2)	(3)	(4)	(5)	(6)
	Dispersion	***Accuracy***	***Dispersion***	***Accuracy***	***Dispersion***	***Accuracy***
Cash	0.001	0.010**				
	[0.895]	[1.971]				
Foreign Cash	0.007***	-0.024***	0.008***	-0.015*	0.008***	-0.022***
	[2.672]	[-2.782]	[2.804]	[-1.677]	[2.768]	[-2.616]
Domestic Cash			0.000	0.013***		
			[0.202]	[2.607]		
SD Income	0.016***	-0.065***	0.016***	-0.066***	0.016***	-0.061***
	[5.105]	[-4.737]	[5.205]	[-4.813]	[5.416]	[-4.599]
Leverage	0.008***	-0.022***	0.008***	-0.021***	0.008***	-0.024***
	[6.991]	[-5.327]	[6.868]	[-5.283]	[7.366]	[-6.732]
Size	-0.001***	0.005***	-0.001***	0.005***	-0.001***	0.005***
	[-7.840]	[8.595]	[-7.868]	[8.640]	[-7.882]	[8.510]
MTB	-0.000***	0.001***	-0.000***	0.001***	-0.000***	0.001***
	[-4.205]	[4.691]	[-4.098]	[4.585]	[-4.172]	[5.365]
R&D	0.007*	-0.018	0.008**	-0.020	0.008**	-0.010
	[1.873]	[-1.282]	[2.061]	[-1.396]	[2.103]	[-0.738]
ROA	-0.012***	0.016*	-0.012***	0.017*	-0.013***	0.016*
	[-4.673]	[1.844]	[-4.700]	[1.883]	[-4.718]	[1.752]
Loss	0.008***	-0.026***	0.008***	-0.026***	0.008***	-0.025***
	[9.027]	[-7.647]	[9.044]	[-7.658]	[9.034]	[-7.586]
Analysts	0.001***	0.000	0.001***	0.000	0.001***	0.000
	[3.469]	[0.112]	[3.528]	[0.075]	[3.551]	[0.273]
AvgPredLag	-0.000***	0.000***	-0.000***	0.000***	-0.000***	0.000**
	[-5.453]	[2.614]	[-5.510]	[2.630]	[-5.525]	[2.491]
Capex	0.014***	-0.027*	0.014***	-0.027*	0.014***	-0.031*
	[3.053]	[-1.708]	[2.974]	[-1.657]	[2.951]	[-1.939]
ForeingIncome	-0.002	-0.017	-0.001	-0.017	-0.001	-0.015
	[-0.389]	[-1.171]	[-0.346]	[-1.211]	[-0.333]	[-1.029]
Constant	0.004***	-0.027***	0.004***	-0.027***	0.004***	-0.025***
	[2.583]	[-5.114]	[2.663]	[-5.214]	[2.707]	[-4.968]
Observations	9,961	9,961	9,961	9,961	9,961	9,961
R-squared	0.280	0.187	0.280	0.187	0.280	0.188
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

The table shows results from estimating Equation (8). We include industry and year fixed effects in the regressions, but we do not report the coefficients. t-statistics are reported in brackets and are based on heteroskedasticity-consistent standard errors clustered at the firm level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels (two-tailed). Variables are defined in Appendix C.

Table 3. Foreign cash and analysts' forecasts: Partitioned Regression results.

	(1) *Dispersion*	(2) *Accuracy*	(3) *Dispersion*	(4) *Accuracy*
Cash	0.001	0.009*	0.001	0.009*
	[0.976]	[1.918]	[0.962]	[1.928]
ForeignCash $_{\text{Low GDP growth}}$	0.008*	-0.036**		
	[1.823]	[-2.024]		
ForeignCash $_{\text{High GDP growth}}$	0.006	-0.002		
	[0.792]	[-0.080]		
ForeignCash $_{\text{Low TAX difference}}$			0.004	-0.007
			[0.883]	[-0.484]
ForeignCash $_{\text{HIgh TAX difference}}$			0.026	-0.114**
			[1.540]	[-2.136]
Domestic Cash				
SD Income	0.016***	-0.065***	0.016***	-0.065***
	[5.073]	[-4.716]	[5.078]	[-4.717]
Leverage	0.008***	-0.022***	0.008***	-0.021***
	[6.966]	[-5.311]	[6.956]	[-5.294]
Size	-0.001***	0.005***	-0.001***	0.005***
	[-7.815]	[8.539]	[-7.855]	[8.586]
MTB	-0.000***	0.001***	-0.000***	0.001***
	[-4.233]	[4.709]	[-4.223]	[4.699]
R&D	0.007*	-0.019	0.008*	-0.019
	[1.916]	[-1.317]	[1.946]	[-1.353]
ROA	-0.013***	0.017*	-0.012***	0.016*
	[-4.695]	[1.864]	[-4.669]	[1.841]
Loss	0.008***	-0.026***	0.008***	-0.026***
	[9.020]	[-7.651]	[9.020]	[-7.646]
Analysts	0.001***	0.000	0.001***	0.000
	[3.473]	[0.108]	[3.513]	[0.059]
AvgPredLag	-0.000***	0.000***	-0.000***	0.000***
	[-5.485]	[2.648]	[-5.488]	[2.655]
Capex	0.014***	-0.028*	0.014***	-0.028*
	[3.063]	[-1.727]	[3.048]	[-1.710]
ForeingIncome	-0.001	-0.019	-0.001	-0.018
	[-0.254]	[-1.298]	[-0.270]	[-1.267]
Constant	0.004**	-0.027***	0.004***	-0.028***
	[2.551]	[-5.075]	[2.648]	[-5.185]
Observations	9,961	9,961	9,961	9,961
R-squared	0.280	0.187	0.280	0.187
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

In this Table the sample is partitioned at the median of GDP growth (Columns 1 and 2) and Tax differences rate between US income tax and income taxes (Columns 1 and 2) of the countries in which the firm has subsidiaries. We include industry and year fixed effects in the regressions, but we do not report the coefficients. t-statistics are reported in brackets and are based on heteroskedasticity-consistent standard errors clustered at the firm level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels (two-tailed). Variables are defined in Appendix C.

Table 4. Foreign cash and volume reactions: Descriptive statistics

	Obs.	***Mean***	***Std Dev***	***p25***	***p50***	***p75***
Investor Uncertainty	9,066	2.004	0.515	2.000	2.000	2.000
Cash	9,066	0.184	0.186	0.036	0.115	0.278
Foreign Cash	9,066	0.066	0.073	0.009	0.043	0.095
DISP	9,066	0.096	0.135	0.022	0.049	0.111
RANGE	9,066	0.413	1.063	0.047	0.114	0.315
NOA	9,066	7.375	5.498	3.000	6.000	10.000
UEDIFF	9,066	0.319	1.075	-0.008	0.117	0.275
PRICEUP	9,066	0.543	0.498	0.000	1.000	1.000
MKTVALUE	9,066	6.689	17.559	0.509	1.415	4.399

The table provides descriptive statistics for the variables included in Equation (9). Variables are defined in Appendix C.

Table 5. Foreign cash and volume reactions: Regression results

	(1)	(2)	(3)
	Investor Uncertainty	**Investor Uncertainty**	**Investor Uncertainty**
Cash	0.704***		
	[6.955]		
Foreign Cash	0.697***	0.907***	1.211***
	[2.815]	[3.674]	[4.766]
Domestic Cash			0.672***
			[6.218]
F-test for differences across coefficients (p-value)			
Foreign Cash = Domestic Cash			[0.000]
DISP	0.888***	0.869***	0.885***
	[6.302]	[6.070]	[6.272]
RANGE	-0.065***	-0.057***	-0.064***
	[-4.646]	[-4.106]	[-4.579]
NOA	0.072***	0.072***	0.072***
	[21.564]	[21.370]	[21.532]
UEDIFF	-0.020	-0.013	-0.019
	[-1.484]	[-0.972]	[-1.416]
PRICEUP	0.002	0.001	0.003
	[0.082]	[0.019]	[0.102]
MKTVALUE	-0.008***	-0.008***	-0.008***
	[-8.085]	[-7.845]	[-8.045]
Observations	9,066	9,066	9,066
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

The table shows results from estimating Equation (9). We include industry and year fixed effects in the regressions, but we do not report the coefficient. t-statistics are reported in brackets and are based on heteroskedasticity-consistent standard errors clustered at the firm level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels (two-tailed). Variables are defined in Appendix C.

Table 6. Foreign cash and volume reactions: Partitioned Regression results

	(1) **Investor Uncertainty**	(2) **Investor Uncertainty**
Cash	0.706***	0.719***
	[6.958]	[7.145]
ForeignCash $_{\text{Low GDP growth}}$	0.916*	
	[1.765]	
ForeignCash $_{\text{High GDP growth}}$	1.115	
	[1.313]	
ForeignCash $_{\text{Low TAX difference}}$		-0.033
		[-0.073]
ForeignCash $_{\text{High TAX difference}}$		6.316***
		[3.544]
DISP	0.890***	0.888***
	[6.307]	[6.306]
RANGE	-0.066***	-0.064***
	[-4.658]	[-4.518]
NOA	0.072***	0.071***
	[21.506]	[21.414]
UEDIFF	-0.020	-0.020
	[-1.509]	[-1.470]
PRICEUP	0.002	0.004
	[0.077]	[0.148]
MKTVALUE	-0.008***	-0.008***
	[-8.127]	[-8.310]
Observations	9,066	9,066
Industry FE	YES	YES
Year FE	YES	YES

In this Table the sample is partitioned at the median of GDP growth (Column 1) and Tax differences rate between US income tax and income taxes (Column 2) of the countries in which the firm has subsidiaries. We include industry and year fixed effects in the regressions, but we do not report the coefficients. t-statistics are reported in brackets and are based on heteroskedasticity-consistent standard errors clustered at the firm level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels (two-tailed). Variables are defined in Appendix C.

Table 7. Robustness tests for corporate governance and geographical diversification

Panel A	(1)	(2)	(3)
	Dispersion	***Accuracy***	***Investor Uncertainty***
Foreign Cash	0.009**	-0.030***	0.655**
	[2.529]	[-2.778]	[2.352]
Foreign Cash * GV	-0.004	0.016	0.240
	[-0.977]	[1.212]	[0.509]
GV	-0.001**	0.002	0.087*
	[-2.021]	[1.412]	[1.860]
Observations	9,961	9,961	9,066
All Controls	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Panel B	(1)	(2)	(3)
	Dispersion	***Accuracy***	***Investor Uncertainty***
Foreign Cash	0.011**	-0.040***	1.034***
	[2.306]	[-3.394]	[2.890]
Foreign Cash * DV	-0.003	0.020	-0.282
	[-0.520]	[1.324]	[-0.617]
DV	-0.001***	0.003*	-0.141***
	[-3.208]	[1.750]	[-3.052]
Observations	9,961	9,961	9,066
All Controls	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

The table shows results from estimating Equations (8) and (9) interacting Foreign Cash with firms' corporate governance index (Panel A) and geographical diversification (Panel B). Each regression includes the full vector of control variables as well as industry and year fixed effects in the regressions. t-statistics are reported in brackets and are based on heteroskedasticity-consistent standard errors clustered at the firm level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels (two-tailed). *GV* is a dummy variable equal to 1 (0) if a firm's g-score is above (below) the sample median. *DV* is a dummy variable equal to 1 (0) if the number of foreign countries (standardized by total assets) in which the company operates is above (below) the sample median. All other variables are defined in Appendix C.

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