

The Disclosure and Valuation of Foreign Cash Holdings

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Abstract

This paper studies the disclosure and valuation of foreign cash holdings using hand-collected data from 2010 to 2013. The SEC has been commenting on foreign cash in its review of 10-K filings since 2011. I find that the SEC tends to target big firms with limited growth and high permanently reinvested earnings. Conditional on the SEC's comment, firms with Big 4 auditors are more likely to disclose foreign cash holdings, but firms with a CEO who is also the Chairman and more free cash flow are less likely to disclose. I find no evidence that the value of foreign cash is discounted relative to domestic cash on average, although the value of foreign cash decreases in foreign cash level. Furthermore, foreign cash is less valuable when firms only disclose limited foreign operations in Exhibit 21 relative to the overseas operations collected by the OSIRIS international database and when firms operate in more foreign countries, but more valuable when the U.S. parent controls the decision-rights of foreign subsidiaries and when foreign growth opportunities are higher. There is no evidence that proxies for the repatriation tax are negatively associated with the value of foreign cash. I also examine market reactions to the Treasury Department's recent crackdown on tax inversions.

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“Congress could permanently modify United States tax policy to set the rate at a lower amount...although these companies will still leave some cash abroad, more of it will come back to the United States. If it were invested, that would be terrific but not necessary as it would also end the *distortions* (emphasis added) that drive even more investment abroad.”

— Steven M. Davidoff, The New York Times, August 16, 2011

“There is little reason not to formally commit funds overseas. Foreign markets offer the best *growth prospects* (emphasis added) for many U.S. companies, and the funds may be needed there to build factories, develop new products or make acquisitions. Plus, the designation can be changed in an instant if the company is prepared to accept the tax bite.”

—Kate Linebaugh, Wall Street Journal, January 23, 2013

1. Introduction

Cash holdings of U.S. corporations have been steadily growing, especially for multinational firms (Pinkowitz et al., 2013). Because the U.S. uses a worldwide tax system, bringing foreign earnings home triggers the repatriation tax determined by the difference between the U.S. statutory tax rate and the foreign tax rate. Since U.S. multinationals often operate in countries with tax rates much lower than in the U.S., the repatriation tax can be sizable, motivating firms to keep foreign earnings offshore (Foley et al., 2007). It is estimated that at least 60% of U.S. multinational firms’ cash is held by their foreign subsidiaries (Mott et al., 2012). The foreign cash issue has recently fueled a controversial discussion about U.S. tax code reform among policy makers who are eager to stimulate domestic investment and employment in the post-crisis era. The immediate concern of policy makers is investment distortion – specifically, domestic underinvestment and foreign overinvestment. Foreign cash, often described as “trapped”, cannot be cheaply used to the benefit of the U.S. economy. Given the availability of foreign cash, firms can afford investing in foreign countries even to the extent of overinvestment. For example, Microsoft used its trapped foreign cash to acquire Skype and Nokia, but both deals were poorly received by the market. This paper’s main focus is on how investors value foreign cash holdings in the equity market, but it starts by investigating the interaction between the regulator (the SEC)

and multinational firms in determining the disclosure of foreign cash holdings. Given the self-selection nature, a determinant model of foreign cash disclosure is needed before the examination of the valuation, and how the SEC and multinational firms together shapes the disclosure regime for foreign cash holdings helps us understand the regulator's interpretation and managers' incentives with respect to foreign cash. The SEC started urging some firms to disclose foreign cash holdings in its review of 10-K filings in 2011 (Thomas, 2011), and this paper first studies how the SEC targets firms. Secondly, this paper investigates firms' decision to disclose foreign cash holdings, given the SEC's comment (or lack thereof). Finally, and most importantly, this paper is able to examine how investors value foreign cash holdings and whether they condition the valuation of foreign cash holdings on firms' characteristics, including the repatriation tax, the agency problem of foreign operations, and foreign growth opportunities.

Using hand-collected data from comment letters and 10-K filings for fiscal years 2010-2013, I find that the SEC targets big firms with limited growth and a large amount of permanently reinvested earnings. On the part of multinational firms, comment recipients are 26% more likely to disclose foreign cash than non-recipients. Comments on peer firms also increase the likelihood of disclosure for firms themselves. Bigger firms with higher total cash holdings, larger permanently reinvested earnings, and Big 4 auditors are more likely to disclose, but firms with a CEO who is also the Chairman, as well as large free cash flow, are less inclined to disclose.

Having established the disclosure model, I turn to the main task of this paper – the valuation of foreign cash holdings. Previous studies using different estimates of and proxies for foreign cash holdings suggest that they could be valued less than domestic cash holdings (Campbell et al., 2014; Bryant-Kutcher et al., 2008). They argue that the repatriation tax is absent and the agency problem from excess cash is arguably less severe for domestic cash than foreign cash.

Anecdotal evidence, however, indicates that firms can funnel foreign cash back to the parent without paying too much repatriation tax through complicated tax-planning (Zion et al., 2011; Drucker, 2010; Linebaugh, 2013b). Also, firms can save foreign cash to be brought back in anticipation of an upcoming tax holiday, and some big firms are indeed lobbying for such a tax break (Newmyer, 2011).¹ To what extent the repatriation tax renders foreign cash holdings different from domestic cash holdings remains less than certain. Moreover, foreign markets may offer the best growth opportunities for many U.S. multinational firms, and foreign cash is a source of funds to these profitable foreign projects. Indeed, previous studies find foreign earnings are valued higher than domestic earnings, a result they attribute to the higher foreign growth opportunities (Bodnar and Weintrop, 1997; Collins et al., 1998). Foreign cash could be valued higher than domestic cash for the exact same reason.

Controlling for the self-selection of voluntary disclosure, I find that *on average* foreign cash holdings are valued similarly to domestic cash holdings. I do, however, find that foreign cash value decreases in foreign cash level but domestic cash value does not depend on domestic cash level. This result is consistent with the argument that the agency problem is more severe for foreign operations than domestic operations; that is, one more dollar of foreign cash is more likely to be abused when firms already accumulate a lot of foreign cash.

I further identify three firm characteristics relevant to foreign cash holdings and investigate their effects on foreign cash value cross-sectionally. The first firm characteristic is the repatriation tax. I find no evidence that the repatriation tax, measured by either the non-binding foreign tax

¹ Theoretical models by Hines and Rice (1994), Weichenreider (1996) and Altshuler and Grubert (2002) also suggest a firm can completely avoid the repatriation tax through permanently investing in foreign financial assets (i.e., holding foreign cash), although De Waegenare and Sansing (2008) find this result is sensitive to the discount rate assumed.

credit status (which occurs when the average foreign tax rate is less than the U.S. statutory tax rate) or the disclosure of the repatriation tax, negatively affects the valuation of foreign cash holdings.

The second firm characteristic is the agency problem of foreign operations from the perspective of investors. Specifically, I use proxies for the disclosure, the organizational complexity, and the decision-rights arrangement of foreign operations to capture the monitoring difficulty for investors. I find foreign cash holdings are less valuable when firms only report foreign subsidiaries partially in their Exhibit 21, relative to the foreign operations collected by the OSIRIS international database. Foreign cash holdings are also less valuable when firms operate in more foreign countries, but are more valuable when the U.S. parent controls foreign subsidiaries' decision-rights.

The third firm characteristic is foreign growth opportunities. Confirming the crucial role of foreign growth opportunities, I find that foreign sales growth not only increases the value of foreign cash but also the value of domestic cash. In sharp contrast, domestic sales growth does not increase either.

The Treasury Department issued a notice of regulations in response to the recent wave of tax inversions on September 22, 2014. Most of the actions are aimed at making avoidance of the repatriation tax on existing foreign earnings harder for inverted firms. I find that stock price of multinationals, involved in inversions or not, falls upon the announcement, especially for firms who do not disclose foreign cash holdings.

This paper differs from other studies on foreign cash valuation in two major ways. First, other studies do not take foreign growth opportunities into account. This paper explicitly demonstrates the importance of foreign growth opportunities in valuing foreign cash. Second, other studies rely on proxies for or estimates of foreign cash holdings, and this paper uses actual

foreign cash holdings disclosed in public filings. As will be discussed in Section 6, different methods of estimating foreign cash holdings can generate inconsistent conclusions.

The rest of the paper is organized as follows. Section 2 includes the background of the U.S. tax rules for foreign earnings, a brief literature review, and the hypothesis development. Section 3 presents the models. Section 4 provides sample selection. Section 5 shows the empirical results. Section 6 discusses the foreign cash estimates used in other studies. Section 7 investigates market reactions to the Treasury Department's crackdown on inversions, and Section 8 concludes.

2. Background, Prior Literature, and Hypothesis Development

2.1 Background

Earnings by U.S. multinational firms' foreign subsidiaries are subject to U.S. taxation at the statutory tax rate, offset by the taxes paid in foreign countries. Although the cash tax happens only when foreign earnings are repatriated to the parent, U.S. income tax expense is recognized when foreign earnings are earned under U.S. GAAP, unless they are declared as permanently reinvested in foreign countries. Suppose the U.S. statutory tax rate τ_D is higher than the foreign tax rate τ_F , and one dollar of after-foreign-tax foreign earnings is repatriated to the U.S. as a dividend.² The repatriation tax is calculated as follows: the one dollar is "grossed up" by foreign tax rate first, $1/(1-\tau_F)$, and this amount is subject to the U.S. tax rate of τ_D , resulting in $\tau_D/(1-\tau_F)$ U.S. gross tax. The foreign taxes paid, $\tau_F/(1-\tau_F)$, can be used as tax credit. Therefore, the repatriation tax equals $\tau_D/(1-\tau_F) - \tau_F/(1-\tau_F) = (\tau_D - \tau_F)/(1-\tau_F)$.

Importantly, the repatriation tax does not need to be recognized if the U.S. parent intends to permanently invest foreign earnings in foreign operations by designating them as permanently

² Nowadays, it is usually the case because the U.S. has the highest statutory tax rate worldwide (Hanlon et al., forthcoming).

reinvested earnings (PRE) under APB Opinion 23 of U.S. GAAP. If PRE are invested in foreign operating assets, neither the operating assets per se nor earnings on the operating assets will be taxed by the U.S. until they are eventually repatriated. If PRE are invested in foreign financial assets (e.g., PRE are held in a foreign bank account as foreign cash earning interest), earnings on the financial assets (e.g., interest) will be taxed by the U.S. immediately according to Subpart F rules of Internal Revenue Code. The initial investment in financial assets per se (e.g. foreign cash that is designated as PRE), however, will not be taxed until it is repatriated.

If foreign operating assets are already at the optimal level, the U.S. parent has two options to dispose of foreign earnings – it can either repatriate foreign earnings to the U.S. immediately or invest in foreign financial assets.³ Repatriating one dollar of foreign earnings results in cash flow of one dollar net of the repatriation tax – $1 - (\tau_D - \tau_F) / (1 - \tau_F) = (1 - \tau_D) / (1 - \tau_F)$ – to the parent, and the cash flow is less than one dollar if $\tau_F < \tau_D$. Investing in foreign financial assets and only repatriating earnings on foreign financial assets each year results in a perpetuity of $(1 - \tau_D)R$, where R is the interest rate (because these earnings are taxed by the U.S. each year as they are earned), and its present value could be either higher or lower than the repatriation cash flow $(1 - \tau_D) / (1 - \tau_F)$, depending on the discount rate.

2.2 Prior Literature

Foley et al. (2007) find that foreign cash holdings of U.S. multinational firms are positively related to the repatriation tax, using proprietary surveys conducted by the Bureau of Economic Analysis (BEA).⁴ Bryant-Kutcher et al. (2008) find that foreign cash held for the purpose of

³ In reality, however, many foreign financial assets are not really “foreign”. Linebaugh (2013a) observes that some companies hold a large amount of foreign cash in U.S. dollars or in U.S. Treasury because managers do not want their earnings to be affected by exchange rate risk.

⁴ Although foreign cash holdings data have been collected by BEA through surveys since the 1980s, only publicly disclosed foreign cash holdings in 10-K filings are appropriate for valuation purpose. Shareholders cannot value information they cannot access.

avoiding the repatriation tax is valued less.⁵ They argue that holding foreign cash has all of the costs of holding domestic cash (e.g. agency problem) but not all of the benefits (e.g., accessibility). In a similar vein, Chen (2014) finds that total cash holdings are less valuable for firms with higher repatriation tax. Taking Foley et al. (2007)'s conclusion as given, she argues that higher repatriation tax signifies higher foreign cash holdings, so her result implies that foreign cash is less valuable than domestic cash. Campbell et al. (2014) (CDKS hereafter) and Thakor (2013) develop two rather different methods to estimate foreign cash holdings and assess the valuation consequences of the estimates. The former study concludes that estimated foreign cash holdings are valued less than estimated domestic cash holdings, but the latter finds the opposite result.

Hanlon et al. (forthcoming) and Edwards et al. (forthcoming) find higher foreign cash holdings are associated with more negative market reactions to the announcement of cash-funded foreign acquisitions. Hanlon et al. (forthcoming) use the repatriation tax as the proxy for foreign cash holdings.⁶ Edwards et al. (forthcoming) use high total cash holdings combined with high PRE as the proxy for high foreign cash holdings.⁷

2.3 Hypothesis Development

This section discusses several factors that affect foreign cash holdings differently than domestic cash holdings, and develop hypotheses on how foreign cash holdings are valued relative to domestic cash holdings on average, as well as how the valuation of foreign cash holdings varies with these factors.

⁵ Since they do not observe foreign cash holdings, they examine the valuation of PRE. If the firm has high PRE and excess cash holdings based on an optimal cash holdings model, they assume PRE is held in the form of cash.

⁶ The repatriation tax used in Hanlon et al. (forthcoming) is a flow-based measure (Pre-tax foreign income \times 35% - Foreign income taxes), which represents how much more taxes would be due if earnings of the *current* year were repatriated. Foreign cash, however, is a stock variable, and conceptually should be determined by the stock of the repatriation tax.

⁷ It is worth noting that both papers have to make two crucial assumptions – foreign acquisitions are made by foreign subsidiaries (not the U.S. parent) using foreign cash (not domestic cash). Empirically, it is impossible to verify either assumption because firms usually do not disclose their deal specifics on this level of granularity.

2.3.1 The repatriation tax

The foremost difference between domestic and foreign cash is tax basis. Domestic cash is after both U.S. and foreign taxes and ready for use without additional costs. Foreign cash is only after foreign tax and its use triggers the repatriation tax, if the foreign tax rate is lower than the U.S. tax rate. Given the widespread use of tax havens by U.S. multinationals (Dyreg and Lindsey, 2009), many firms will incur the repatriation tax if they access their foreign cash. The different tax basis suggests foreign cash is more expensive to use and less valuable than domestic cash.

In practice, the repatriation tax that firms actually face is rarely as simple as the formula $(\tau_D - \tau_F)/(1 - \tau_F)$. This formula assumes firms have only one foreign subsidiary in one country. In reality, firms usually operate in multiple foreign countries and their foreign subsidiaries all have different degrees of profitability. For example, Pixelworks, Inc., in its 10-K filing for fiscal year 2013, discloses, “Although cash balances held at our foreign subsidiaries would be subject to U.S. taxes if repatriated, we have sufficient U.S. net operating losses to eliminate the liability associated with any such repatriation and foreign taxes due upon repatriation would not be significant.” It is precisely the complex and hypothetical nature that many firms cite as the reason they do not provide an estimate of the repatriation tax.

Also, anecdotal evidence suggests that firms employ tax-planning strategies to circumvent the repatriation tax to bring home foreign cash tax-free. Drucker (2010) discusses several tax-planning quirks nicknamed “Killer B”, “Deadly D” and “Outbound F”, based on the IRS tax code loopholes they take advantage of. For example, “Killer B” stands for the strategy where the U.S. parent issues shares to its foreign subsidiaries in exchange for their cash (a tax-free transaction), and foreign subsidiaries can use the shares as currency to make other acquisitions. Some firms also indicate in their 10-K filings that they will time or structure the repatriation such that minimal tax

will be incurred. For example, Eastman Kodak's 10-K filing in 2010 says "from time to time and to the extent that the Company can repatriate overseas earnings on essentially a tax-free basis." Some firms are also able to pull cash from foreign subsidiaries as short-term loans and incur no taxes, as long as the firms are careful enough not to let these loans cross the boundaries of fiscal quarters and breach IRS rules (Linebaugh, 2013b). As an example, Scientific Games Corp states in its 10-K filings in 2012 that "A significant amount of the cash held by our foreign subsidiaries as of December 31, 2013 could be transferred to the U.S. as intercompany loan repayments and other tax-free basis reductions." Therefore, the repatriation tax might not be as drastic as the face value suggested by the simplified formula. As Stephen Shay, a tax professor of Harvard Law School, put it, "Less money is trapped offshore than thought" (Linebaugh, 2013b).

A subtler implication of the repatriation tax is the detrimental effect of domestic underinvestment, especially for financially constrained firms. This is also one of the most popular concerns raised by policy makers and politicians who advocate a tax regime overhaul. The idea is that firms without easy access to external funds or sufficient domestic cash flows to finance domestic investment could have tapped into their foreign cash but did not because of the reluctance to pay the repatriation tax. Faulkender and Petersen (2012) indeed find that domestic investment increased for financially constrained firms during the last tax holiday (American Job Creation Act in 2004). They also find, however, that most firms who did repatriate during the tax holiday were not financially constrained, suggesting that the repatriation tax and foreign cash holdings that go along with it do not cause significant domestic underinvestment in the first place.

Domestic underinvestment is only one side of the coin. The other side of the same coin is foreign overinvestment, which will be discussed below.

2.3.2 Agency problem of foreign operations

Agency costs in terms of monitoring and bonding foreign operations are high (Doukas and Travlos, 1988). Managers have incentives to hold on to cash because they do not want to subject themselves to the discipline of the external capital market (Jensen, 1986), and the repatriation tax gives managers a legitimate reason to keep cash offshore but still inside firms. The agency problem, although not specific to foreign operations, is more severe for foreign operations than domestic operations for several reasons. First of all, the disclosure of foreign operations by multinational firms is opaque. Geographic segment reporting is highly aggregated and voluntary, and information on the foreign segments' management is close to non-existent. From the standpoint of investors, the information asymmetry with foreign operations is much worse than domestic operations, and it provides opportunities for managers to abuse foreign resources. Thomas and Hope (2008) find that firms who stop reporting geographic segment earnings after SFAS 131 exhibit empire-building behavior in their foreign operations.

Besides opaque disclosure, multinational firms also have more complex organizational structures (Creal et al., 2013). Multinational firms, usually conglomerates that also diversify in industries (Denis et al., 2002), might allocate internal resources irrationally, and the investment inefficiency can be tied to agency problems (Glaser et al., 2013; Ozbas and Scharfstein, 2010).

In addition to the traditional principal-agent relation between investors and the U.S. parent, there exists an internal principal-agent relation between the U.S. parent and foreign subsidiaries (Shroff et al., 2014). This additional layer of agency, coupled with the geographic distance, makes foreign operations farther out of reach for investors.

As mentioned earlier, the flip side of domestic underinvestment caused by the repatriation tax is foreign overinvestment. When firms accumulate significant amounts of cash abroad, investors are likely to pressure managers to distribute cash. If managers are reluctant to repatriate

and take the tax bite or do not want to relinquish control over cash, they will look for opportunities to spend the foreign cash. Although this strategy per se does not necessarily destroy shareholders' value if returns on foreign investment are more favorable than receiving after-repatriation-tax cash, prior studies suggest that managers do not make the best investment decisions when they have a lot of cash at their disposal (Harford, 1999). Evidence provided by Edwards et al. (forthcoming) and Hanlon et al. (forthcoming) also indicates foreign overinvestment. Foreign cash holdings, therefore, imply investment distortion on both the domestic and foreign fronts.

2.3.3 Growth opportunities

Despite the pitfalls of keeping cash offshore, one cannot ignore why firms choose to operate in foreign countries in the first place – foreign countries represent the highest growth for many multinationals. The transaction cost explanation of cash holdings suggests that firms with higher growth opportunities should hold more cash, because it is more important for them to have inexpensive internal funds to finance positive NPV projects. By the same token, if foreign subsidiaries have more growth opportunities than their U.S. parent, it is rational for them to hold more cash. Desai et al. (2011) show that U.S. foreign investment is “dynamically efficient” in the sense that cash flows from foreign affiliates exceed net investments, so foreign investment is a source of funds to the U.S. rather than a sink.

Bodnar and Weintrop (1997) and Collins et al. (1998) find that foreign earnings have a higher earnings response coefficient than domestic earnings, and they attribute this finding to the higher foreign growth opportunities. Creal et al. (2013) provide evidence that there is a “multinational advantage” in the sense that multinational firms are valued more than the sum of imputed value of their country-industry segments, and the value differential increases in foreign

sales.⁸ They conclude that the benefits provided by efficient internal capital market dominate the higher agency problem. Given the sheer size of foreign cash holdings and the fact that cash is roughly valued dollar for dollar, it is hard to imagine that foreign cash is discounted by investors but the multinational advantage still exists. These studies taken together suggest that foreign sales or earnings are viewed favorably in the equity market. If everything else foreign is rewarded by investors, it is possible that foreign cash can also be deemed more valuable.

2.3.4 Efficient internal capital market

Prior literature on multinational firms demonstrates that multinationals can successfully employ their internal capital market to circumvent market frictions. Desai et al. (2006) show that multinationals actively get around host countries' capital controls through repatriation of profit. Desai et al. (2004) and Huizinga et al. (2008) find that multinationals shift more debt to high tax-rate countries to take advantage of the tax shield. Desai et al. (2008) find U.S. multinationals' foreign subsidiaries increase investment more than local firms when the host countries experience currency depreciation, because the subsidiaries can turn to internal capital market for funds. These findings indicate that multinationals are capable of moving their internal funds across borders to maximize the valuation of the entire firm. If multinationals understand that investors value cash more when it resides in certain places, they are motivated to move cash internally to the places where it is mostly valued. In this sense, the valuation of cash holdings should not depend on their locations because geography might not be a significant constraint for multinationals.

⁸ The study is in the same genre as diversification discount/premium literature where the value of a multi-segment firm is compared with the sum of the value of each segment had it been a stand-alone firm. Denis et al. (2002) find a globalization discount rather than premium for multinational firms, but Creal et al. (2013) point out a methodology weakness in their paper. When calculating the imputed value of each geographic segment, Denis et al. (2002) match it to firms in the same industry in the U.S. Creal et al. (2013), on the other hand, match each segment with firms in the same industry and the same country, because the contra-factual of the segment would be a stand-alone firm in the same industry and geographic region rather than a firm in the same industry in the U.S. Using a similar methodology to Denis et al. (2002), Bodnar et al. (1999) also find a globalization premium rather than discount.

2.3.5 Hypotheses

My first hypothesis predicts on average how foreign cash is valued relative to domestic cash when all the factors discussed above are taken into account. Given the countervailing forces, I state the hypothesis in the null form:

Hypothesis 1: Foreign cash is valued similarly to domestic cash.

In addition to the average effect, I further explore how the cross-sectional variation in the factors discussed above – the repatriation tax, the agency problem of foreign operations, and foreign growth opportunities – will affect the valuation of foreign cash holdings.

The first factor is the repatriation tax. Firms whose foreign tax rate is greater than the U.S. tax rate have binding foreign tax credit status and will not trigger any additional tax costs upon repatriation, but firms with non-binding foreign tax credit status will. Also, firms who offer an estimate of the repatriation tax in their filings do so arguably because the amount is material (Bryant-Kutcher et al., 2008). Therefore, the second hypothesis is predicted as follows:

Hypothesis 2: Firms with non-binding foreign tax credit status have less valuable foreign cash.
Firms who voluntarily disclose their repatriation tax have less valuable foreign cash.

The second factor is the agency problem of foreign operations, and I examine this factor through multiple angles, including the disclosure, the organizational complexity, and the decision-rights arrangement of foreign operations. The only publicly available disclosure on foreign subsidiary level is Exhibit 21, one of the attachments filed with 10-K filings. The SEC requires firms to list the name and location of subsidiaries that are significant operations in Exhibit 21. This disclosure, although small, provides investors a chance to gauge the scope and complexity of foreign operations (Holzer, 2013). The SEC, however, gives firms leeway in deciding what is

“significant.” As a result, disclosure of subsidiaries in Exhibit 21 can be strategic, and some multinational firms do not even file Exhibit 21. Holzer (2013) and Gremalich and Whiteaker-Poe (2013) document “the vanishing subsidiary” phenomenon, in which some of the largest U.S. multinational firms disclose fewer and fewer subsidiaries in Exhibit 21. For example, Oracle reported more than 400 subsidiaries in 2010, and the list shrank to eight subsidiaries in 2012. Not knowing how many foreign subsidiaries the multinational firm has and where it operates poses a big challenge for investors to understand and monitor foreign operations. Assuming investors can assess whether firms disclose too few foreign subsidiaries, I predict that investors will discount the value of foreign cash for firms who underreport foreign operations. I use the OSIRIS international database that collects firms’ foreign subsidiaries through company registries in foreign countries as the benchmark against which I compare firms’ own disclosure.⁹ Information asymmetry reduces the value of total cash (Drobetz et al., 2010), and intuitively, information asymmetry with respect to foreign operations should be negatively associated with the value of foreign cash.

Because of operations in different locations, the complex organization of multinational firms makes monitoring managers harder (Bodnar et al., 1999). It is reasonable to assume that the extent of organizational complexity and the difficulty of monitoring increase in the number of distinct foreign countries. Morck and Yeung (1991) also use this measure to capture “multinationality”.¹⁰ I expect multinationals operating in more foreign countries to have less valuable foreign cash.

⁹ For example, Apple Inc discloses only two to three Irish subsidiaries each year in Exhibit 21. For such a large firm, it is hard to imagine it has this few material foreign subsidiaries. Apple has more than 50 foreign subsidiaries in OSIRIS.

¹⁰ Prior studies often use the number of geographic segments to measure complexity (e.g., Li, 2008), but the grouping is rather coarse and the cross-sectional variation is very limited.

As discussed above, there exists an internal agency between the U.S. parent and foreign subsidiaries. Robinson and Stocken (2013) introduce a simple way of measuring the location of foreign subsidiaries' decision-rights, a contractual arrangement within multinationals. They argue that if foreign subsidiaries use the local currency instead of the U.S. dollar as the functional currency, it indicates that foreign subsidiaries themselves control their own decision-rights. Using U.S. dollar as the functional currency, on the other hand, indicates a more centralized control by the U.S. parent. Admittedly, the location of decision-rights is not completely congruent with the idea of the internal agency problem. Decentralizing decision-rights might be the optimal organizational form given the business environment rather than the parent's lack of ability to enforce control over foreign subsidiaries. Still, I argue that these two constructs are related, i.e., when decision-rights largely lie in the hands of the U.S. parent, the agency problem between the U.S. parent and foreign subsidiaries is alleviated. From the perspective of investors, centralized decision-rights make foreign cash more accessible in the sense that investors can control it better through monitoring the U.S. parent. The three aspects of the agency problem of foreign operations and their effects on foreign cash are summarized as follows:

Hypothesis 3: Foreign cash is valued less when firms underreport foreign subsidiaries in Exhibit 21. Foreign cash is less valuable when firms operate in more foreign countries. Foreign cash is more valuable when the U.S. parent controls foreign subsidiaries' decision-rights.

Finally, I explicitly examine the effect of foreign growth opportunities on foreign cash holdings. Total cash holdings are shown to be more valuable when firm-level investment opportunities are higher (Pinkowitz and Williamson, 2002). By the same token, the valuation of foreign cash holdings should increase in foreign growth opportunities. Foreign investment opportunities might even spill over to domestic operations, offsetting the domestic

underinvestment concern. Desai et al. (2009) show that domestic investment is positively related to foreign investment. To state the hypothesis formally,

Hypothesis 4: Foreign cash is more valuable when foreign growth opportunities are higher.

3. Sample Selection

Since disclosing foreign cash holdings is a new phenomenon, I focus on U.S. multinational firms in COMPUSTAT from fiscal year 2010 to 2013. To first identify a sample of U.S. multinational firms, I retrieve all firms in COMPUSTAT with non-missing and non-zero “Pretax income-Foreign” (PIFO) and “Income taxes-Foreign” (TXPO).¹¹ Following previous studies on cash holdings, I exclude financial firms (SIC code starting with 6) and utility firms (SIC code starting with 49) because they either hold cash for different purposes or their corporate decisions are heavily regulated. To make sure that the U.S. tax rules indeed apply to firms in my sample, I only include firms incorporated in the U.S. I further require the sample firms to be headquartered in the U.S., because some U.S.-incorporated firms actually have their major operations in another country. For example, some Chinese firms choose to be incorporated in the U.S. to tap the U.S. capital market, but their entire business is in China, and naturally most of the cash they hold is Renminbi (RMB). It does not make sense to classify such cash as “foreign”.

The domestic and foreign cash holdings are collected from 10-K filings, and in most cases this breakdown is disclosed in the “Liquidity” section of item 7 – “Management Discussion and Analysis”. Prior studies on cash valuation all use cash and short-term investments in COMPUSTAT (CHE) as the definition for cash. Some firms use a different definition when disclosing foreign cash holdings. Fortunately, firms usually also disclose total cash holdings using

¹¹ These two items are the only COMPUSTAT variables that can identify the extent of foreign operations (Foley et al., 2007).

their own definition. Here is an example of Valhi Inc.'s 10-K filed on March 17, 2014: "At December 31, 2013, we had an aggregate of \$193.5 million of restricted and unrestricted cash, cash equivalents and marketable securities, 63.2 of which was held outside U.S." Some of the marketable securities must be long-term, because the value of cash and short-term investments is 157 million in COMPUSTAT. To facilitate the comparison across firms, I make the assumption that the proportion of foreign cash to total cash is the same across all definitions of cash, so foreign cash in this case is calculated as $(63.2/193.5)*157=51.3$ million.¹²

PRE and the repatriation tax (if disclosed) are also collected from 10-K filings, usually under "Income taxes" in "Notes to financial statements." To further ensure that firms have relatively significant foreign operations such that it is possible for them to have some foreign cash, I only keep firms with positive PRE. Comment letters from the SEC are collected as follows. I first download all the SEC comment letters from EDGAR (filing type is "UPLOAD") for my sample firms from January 2010 to March 2014. I then write a Perl program to single out the comment letters that mention the word "foreign." I read all these comment letters and discard the ones unrelated to foreign cash. The other data sources are the usual databases. Financial statement data is from COMPUSTAT, stock return data is from CRSP, institutional ownership data is from Thomson Reuters Institutional Ownership (13-f) database, and analyst data is from I/B/E/S.

Table 1, Panel A presents the number of firms in the sample across years. Disclosure of foreign cash in fiscal year 2010 is truly voluntary, and only 12.2% of firms disclose. After the sudden wave of foreign cash comments on filings of fiscal year 2010, disclosure rate jumped from 12.2% in fiscal year 2010 to 48.6% in fiscal year 2011. An increasing number of multinationals

¹² About 25% of the sample firms do not use COMPUSTAT's CHE as definition when disclosing foreign cash holdings. Results are very similar if these observations are excluded.

became disclosers, with 61% and 68% of them disclosing in fiscal years 2012 and 2013, respectively. The number of foreign cash comments decreased correspondingly. These patterns provide initial evidence that the SEC's review process is effective in changing firms' disclosure of foreign cash holdings.

Panel B shows the distribution of foreign operations. The distributions of domestic and foreign cash are skewed. The average domestic and foreign cash holdings are 708 million and 1232 million, and the median domestic and foreign cash holdings are only 123 million and 167 million. When cash holdings are scaled by total assets, the distributions are much less skewed. On average, domestic cash comprises 10% of total assets, and foreign cash comprises another 10%. The firm with the highest foreign cash holdings, 69.6 billion, is Microsoft, and the firm with the highest domestic cash holdings, 63.8 billion, is GE. Permanently reinvested earnings are on average 15% of total assets, reflecting the large scope of foreign operations. According to firms' own disclosure, the repatriation tax is around 4% of total assets.

4. The SEC's Comment Decision and Firms' Disclosure Decision

This section investigates the dynamics between the SEC and multinational firms concerning the disclosure of foreign cash holdings and asks two questions: (1) How does the SEC choose firms to comment on; and (2) Given the comment (or lack thereof), how do firms respond?

Comments on foreign cash are interesting in the sense that firms' not disclosing foreign cash is not even a disclosure inadequacy. Understanding how the SEC decides which firms to target helps us understand the regulator's interpretation of the foreign cash issue, because presumably the SEC singles out firms whose foreign cash disclosure can aid investors' decision-making the most.

On multinational firms' part, seeing what factors determine foreign cash disclosure reveals the costs and benefits that firms perceive when considering what to tell investors about their foreign cash holdings. Moreover, because of the self-selection, a disclosure determinant model is needed before examining the valuation of foreign cash holdings.

4.1 The SEC's Comment Decision

The SEC review process is mandated by SOX Section 408, which explicitly sets forth several firm characteristics the SEC considers important. Incorporating the findings of Cassell et al. (2013) who study the determinants of the receipt of comment letters (regardless of the specific issues raised by the SEC), I include five aspects in the SEC's comment decision model – factors mentioned by SOX Section 408, profitability, complexity, external corporate governance and internal corporate governance. SOX Section 408 factors include material internal control weakness (*weakness*), restated financial statements (*restatement*), stock return volatility (*highvol*), market capitalization (*size*) and market-to-book ratio (*tobinq*). Profitability is measured by accounting performance (*roa*) and sales growth (*salesgrowth*). Complexity is measured by age (*age*), the number of business segments (*bus_segments*), the number of geographic segments (*geo_segments*), mergers and acquisitions (*ma*), restructuring activities (*restructuring*), external financing (*extfinancing*) and litigation risk (*litigation*). I use Big 4 auditor (*big4*), institutional ownership (*institution*) and analyst following (*analysts*) to measure external corporate governance mechanisms, and an indicator of whether the CEO is also the Chairman of the board of directors (*duality*) to measure internal corporate governance.¹³

¹³ Duality is the only significant internal governance determinant in Cassell et al. (2013).

I further predict that variables specifically related to foreign operations or cash holdings will affect the probability of receiving a foreign cash comment. The SEC should prompt firms to disclose foreign cash holdings if their illiquidity is a material issue; that is, the potential repatriation tax is larger. Therefore, firms with non-binding foreign tax credit status (*nonbinding*) are more likely to receive a comment on foreign cash holdings. If firms do disclose the repatriation tax (*taxdisclosure*), however, the SEC should have less incentive to target these firms, because investors already know the costs of using the illiquid foreign cash. Foreign cash holdings should only be an issue when firms hold large amount of total cash to begin with, so I expect that total cash holdings (*totalcash*) are positively related to the probability of receiving a foreign cash comment. Firms with more foreign operations are more likely to concern the SEC because these operations could potentially trap more foreign cash. The designation of PRE is also how most firms get to accumulate offshore cash in the first place.¹⁴ I use PRE (*pre*) to measure the extent of foreign operations. I also include year and industry fixed effects. All variable definitions are detailed in Appendix 1. The Probit model for estimating the probability of receiving a foreign cash comment is as follows:

$$\begin{aligned} \Pr(\text{fcashcomment}_t = 1) = & \Phi(\alpha + \beta_1 \text{weakness}_t + \beta_2 \text{restatement}_t + \beta_3 \text{highvol}_t + \beta_4 \text{size}_t + \beta_5 \text{age}_t + \beta_6 \text{roa}_t \\ & + \beta_7 \text{salegrowth}_t + \beta_8 \text{bus_segments}_t + \beta_9 \text{geo_segments}_t + \beta_{10} \text{tobinq}_t + \beta_{11} \text{ma}_t \\ & + \beta_{12} \text{restructuring}_t + \beta_{13} \text{extfinancing}_t + \beta_{14} \text{litigation}_t + \beta_{15} \text{big4}_t + \beta_{16} \text{institution}_t \\ & + \beta_{17} \text{analysts}_t + \beta_{18} \text{duality}_t + \beta_{19} \text{nonbinding}_t + \beta_{20} \text{totalcash}_t + \beta_{21} \text{pre}_t \\ & + \beta_{22} \text{taxdisclosure}_t + \text{Industry FE} + \text{Year FE} + \varepsilon) \end{aligned} \quad (1)$$

Firms who receive a foreign cash comment on current year's 10-K filings have *fcashcomment* equal to 1, and 0 otherwise. Because firms who already disclose foreign cash holdings are certainly not going to receive a foreign cash comment, I exclude them in this test. The review process for fiscal year 2013 is not yet complete, so I also estimate this model without 2013.

¹⁴ Graham et al. (2011) even use PRE directly as a proxy for foreign cash holdings.

4.2 Firms' Decision to Disclose Foreign Cash Holdings

Given the SEC's comment decision, and firms' understanding of how the SEC makes the decision, firms will react accordingly with other factors of the disclosure decision in mind. If firms can rationally decipher the SEC's decision-making process, they might react pre-emptively by voluntarily disclosing foreign cash holdings even when they have not received a comment yet.¹⁵ Therefore, on top of the SEC's actual comment decision on previous years' 10-K filings (*commentbefore*), I include all the variables in model 1 in the disclosure model. These variables are also important determinants of disclosure in other settings (e.g., Lang and Lundholm, 1993; Li, 2008). The expected signs of several variables are different from model 1, though. I expect *duality* is negatively related to the probability of disclosing foreign cash holdings, although I expect *duality* is positively related to the receipt of a foreign cash comment. More entrenched managers are less likely to accommodate investors' needs for better information, and previous studies find firms with less effective governance are less likely to issue management forecasts (Karamanou and Vafeas, 2005; Ajinkya et al., 2005) and less conservative (Ahmed and Duellman, 2007). Expecting this relation, the SEC is more likely to target these firms on behalf of investors. In a similar vein, although I expect the SEC to pressure firms with high potential repatriation tax, I predict managers of these firms are less likely to disclose. Disclosing foreign cash holdings is essentially revealing a hidden cost, a form of bad news that investors might have been unaware of before, and managers generally tend to withhold bad news (Kothari et al, 2009).¹⁶ The flip side of

¹⁵ It is worth noting that every firm has to be reviewed by the SEC at least once every three years. Since my sample period covers four years, it is not surprising that almost 88% of firms receive comment letters. The issues raised by the SEC in the comment letters can vary drastically though, and that is why it is interesting to investigate the determinants of the specific issues raised.

¹⁶ Although investors might be able to estimate the repatriation tax based on foreign income taxes and pre-tax foreign income, disclosing foreign cash holdings directly is a much more salient way to inform investors of the illiquidity of the cash position. This is especially true considering investors' limited attention and lack of sophistication.

this argument is that firms object less to disclosing foreign cash holdings if they already divulge the repatriation tax; that is, *taxdisclosure* should be positively related to the likelihood of disclosure.

Brown et al. (2013) document the spillover effect of risk factor comment. To incorporate the possible spillover effect of foreign cash comment, I include a variable *peercomment* that equals 1 if the firm itself does not receive a foreign cash comment, but at least one firm in the same 2-digit SIC industry receives a foreign cash comment on previous year's filings.

I also include several additional variables related to the disclosure decision but not covered by the battery of variables above. In addition to *duality* and *nonbinding*, I add free cash flow (*freecashflow*) as another managerial incentive measure. Thomas and Hope (2008)'s finding that firms not reporting foreign earnings become empire-builders suggests that empire-builders use opaque disclosure to mask their self-serving activities. Empire building is a more severe problem when firms have large amount of free cash flow (Jensen, 1986), and such firms are less likely to promote transparent disclosure. Another important factor related to disclosure is proprietary information. The breakdown of domestic and foreign cash holdings is a more refined disclosure, and firms with higher proprietary costs prefer less refined disclosure. Since proprietary cost proxies at subsidiary level are unavailable, I control for proprietary costs at firm level using R&D expense (*rnd*). The Probit model is as follows:

$$\begin{aligned} \Pr(\text{disclosure1}/2_t=1) = & \Phi(\alpha + \beta_1 \text{commentbefore}_{t-1} + \beta_2 \text{peercomment}_{t-1} + \beta_3 \text{weakness}_t + \beta_4 \text{restatement}_t \\ & + \beta_5 \text{highvol}_t + \beta_6 \text{size}_t + \beta_7 \text{age}_t + \beta_8 \text{roa}_t + \beta_9 \text{salegrowth}_t + \beta_{10} \text{bus_segments}_t \\ & + \beta_{11} \text{geo_segments}_t + \beta_{12} \text{tobinq}_t + \beta_{13} \text{ma}_t + \beta_{14} \text{restructuring}_t + \beta_{15} \text{extfinancing}_t \\ & + \beta_{16} \text{litigation}_t + \beta_{17} \text{big4}_t + \beta_{18} \text{institution}_t + \beta_{19} \text{analysts}_t + \beta_{20} \text{duality}_t \\ & + \beta_{21} \text{nonbinding}_t + \beta_{22} \text{totalcash}_t + \beta_{23} \text{pre}_t + \beta_{24} \text{taxdisclosure}_t + \beta_{25} \text{freecashflow}_t \\ & + \beta_{26} \text{rnd}_t + \text{Industry FE} + \text{Year FE} + \varepsilon_t) \end{aligned} \quad (2)$$

The dependent variable is either *disclosure1*, which equals 1 for quantitative disclosure of foreign cash holdings or *disclosure2*, which equals 1 for both quantitative and qualitative disclosure, as

some firms only describe the extent of foreign cash holdings (e.g., majority of the cash is held in foreign subsidiaries). The first determinant, *commentbefore*, is the SEC's comment decision on previous years' 10-K filings. Since the SEC issued no foreign cash comment when reviewing 10-K filings of fiscal year 2009, all the observations in fiscal year 2010 have *commentbefore* equal to 0. I run model 2 both with and without fiscal year 2010.

4.3 Results of the Probit Models

Table 2, Panel A reports the descriptive statistics of the variables used in the Probit models. About 45% of firms choose to disclose the exact amount of foreign cash and 3% of firms only disclose qualitatively. Fewer firms disclose the repatriation tax, only 15%. Firms in my sample are generally large, old and well-followed by analysts and mostly held by institutions, with a low rate of internal control material weakness (3%) and restatement (5%). Consistent with the idea that multinational firms are complex, 41% of them are involved in M&A activities and 53% of them undergo restructuring. There are 71% of firms with non-binding foreign tax credit status, suggesting that most firms will incur the repatriation tax if they want to access foreign cash.

Table 3 presents the results of the SEC's comment decision. I first only include the general factors affecting the receipt of comment letters in column 1. Consistent with intuition, larger firms are more likely to be targeted. Contrary to the SEC's claim, firms with lower Tobin's Q are more likely to receive a foreign cash comment, but it is exactly low growth firms who tend to accumulate piles of cash because they have limited projects on which to spend money. The negative coefficient on *salesgrowth* further confirms this argument. Firms with fewer business segments and M&A activities are more likely to receive a foreign cash comment, possibly also due to lower growth. It is worth noting that many variables in Cassell et al. (2013) are insignificant here because most

firms receive comment letters (with or without foreign cash comment in them) in my sample.¹⁷ In column 2, I add variables more related to foreign cash holdings. The coefficients of *totalcash* and *nonbinding* are not insignificant. Firms with higher permanently reinvested earnings are more likely to receive a comment, and one standard deviation increase in *pre* is associated with 2.2% increase in the probability of being commented on. Disclosing the repatriation tax decreases the probability of receiving a comment by almost 4%.

Table 4 provides the results of firms' disclosure decision. The dependent variable is *disclosure1* in the first two columns and *disclosure2* in the last two columns. Receiving a foreign cash comment before increases the probability of disclosure by almost 21%-26%, depending on the specification. Having a peer receive a comment letter increases the probability of disclosure by 8%, although it is insignificant in column 2. Many other factors also play important roles. Firms restating their financial statements are 9% less likely to disclose foreign cash holdings, suggesting transparency is lacking for these firms generally. Larger firms, lower growth firms, and more complex firms with a greater number of business segments and M&A activities are more likely to disclose foreign cash holdings. Firms who hire Big 4 auditors are 11% more likely to disclose. Firms with high cash holdings and permanently reinvested earnings are more inclined to disclose foreign cash. The coefficient of *duality* is significantly negative, indicating an entrenched CEO is 4.6% less likely to disclose. Further supporting the managerial incentive's effect on disclosure, *freecashflow* is also negative as predicted, although only significantly so in column 2. The coefficient of *nonbinding* is insignificant. Results are similar for *disclosure1* versus *disclosure2*,

¹⁷ I also exclude firms that never receive a comment letter in my sample period so that all the firms receive at least one comment letter (with or without foreign cash comment). The results are qualitatively the same.

although the comment letters' spillover effect is more prominent and the number of geographic segments is also positive for *disclosure2*.

5. Valuation of Disclosed Domestic and Foreign Cash Holdings

Having established the disclosure decision by multinational firms conditional on the SEC's intervention, I now move on to the more important task of this paper: the study of how equityholders value foreign cash holdings, using domestic cash holdings as a natural benchmark. The section starts with the models and the results on how foreign cash is valued on average, followed by the cross-sectional variation in firms' characteristics on the value of foreign cash.

5.1 Models

Most prior papers on cash valuation use a variant of the model first introduced by Faulkender and Wang (2006). The dependent variable is contemporaneous abnormal returns, and the variable of interest is the change in total cash holdings scaled by market value of equity at the beginning of the year ($\Delta cash$). The coefficient of $\Delta cash$ translates to the market value of one extra dollar of cash. To measure the valuation of domestic and foreign cash holdings, I split $\Delta cash$ into the change in domestic cash holdings, $\Delta dcash$, and the change in foreign cash holdings, $\Delta fcash$. Only firms who disclose the foreign versus domestic breakdown can enter the valuation model. I employ Heckman two-stage model to control for the self-selection, and the first-stage selection model is the model used in column 1 of Table 4.¹⁸ The valuation model is as follows¹⁹:

¹⁸ Because most variables in the selection model are levels and most variables in the valuation model are changes, technically there is no overlap in the independent variables in the two models. Still, most of the variables in the selection model are expected to affect valuation. It is reasonable to assume that the SEC's comment decision on firms' peers is exogenous to firms' own valuation, so peer firms' receipt of foreign cash comment should serve the identification purpose.

¹⁹ I do not include PRE in the model because PRE is part of foreign earnings, already included in the model. Including PRE or ΔPRE in the model does not change any conclusion.

$$ar_{i,t} = \alpha_0 + \alpha_1 \Delta dcash_{i,t} + \alpha_2 \Delta fcash_{i,t} + \alpha_3 \Delta domearnings_{i,t} + \alpha_4 \Delta forearnings_{i,t} + \alpha_5 \Delta netassets_{i,t} + \alpha_6 \Delta rd_{i,t} + \alpha_7 \Delta interest_{i,t} + \alpha_8 \Delta dividends_{i,t} + \alpha_9 cash_{i,t-1} + \alpha_{10} lev_{i,t} + \alpha_{11} netfinancing_{i,t} + \alpha_{12} \Delta cash_{i,t} \times cash_{i,t-1} + \alpha_{13} \Delta cash_{i,t} \times lev_{i,t} + \alpha_{14} \log_assets_{i,t} + \alpha_{15} Mills + industry\ FEs + year\ FEs + \varepsilon_{i,t} \quad (3)$$

The dependent variable $ar_{i,t}$ is the buy-and-hold returns of firm i during fiscal year t minus the buy-and-hold returns of the corresponding Fama-French 5x5 portfolio to which firm i belongs.²⁰ Δx is the change in variable x from fiscal year $t-1$ to t . $dcash$ is domestic cash, $fcash$ is foreign cash, and they add up to total cash. $domearnings$ is domestic earnings, which is calculated as earnings before extraordinary items minus $forearnings$. $forearnings$ is foreign after-tax earnings. $netassets$ is total assets net of cash. rd is research and development expense, and missing values in COMPUSTAT are treated as zero. $interest$ is interest expense. $dividends$ is common dividends. $cash_{i,t-1}$ is the lagged cash holdings. lev is market leverage, which is the sum of short- and long-term debt divided by sum of short- and long-term debt and market value of equity. $netfinancing$ is the sum of new equity issues and new debt issues. \log_assets is log of total assets. $Mills$ is the inverse Mill's ratios from the selection model. Except lev , \log_assets and $Mills$, all the other independent variables are scaled by market value of equity at the beginning of fiscal year t . The comparison between α_1 and α_2 answers how foreign cash is valued relative to domestic cash.

In addition to model 3, I evaluate three other specifications. CDKS and Thakor estimate the following model:

$$ar_{i,t} = \alpha_0 + \alpha_1 \Delta cash_{i,t} + \alpha_2 dcash_{i,t-1} + \alpha_3 fcash_{i,t-1} + \alpha_4 \Delta cash_{i,t} \times dcash_{i,t-1} + \alpha_5 \Delta cash_{i,t} \times fcash_{i,t-1} + \alpha_6 \Delta domearnings_{i,t} + \alpha_7 \Delta forearnings_{i,t} + \alpha_8 \Delta netassets_{i,t} + \alpha_9 \Delta rd_{i,t} + \alpha_{10} \Delta interest_{i,t} + \alpha_{11} \Delta dividends_{i,t} + \alpha_{12} lev_{i,t} + \alpha_{13} netfinancing_{i,t} + \alpha_{14} \Delta cash_{i,t} \times lev_{i,t} + \alpha_{15} \log_assets_{i,t} + \alpha_{16} Mills + industry\ FEs + year\ FEs + \varepsilon_{i,t} \quad (4)$$

²⁰ Because Fama-French 5x5 portfolios are formed at the end of every June but firm i 's fiscal year end can be any month, it is possible that the assignment of the portfolio changes during fiscal year t . Also, lagging the yearly returns by three months following the fiscal year end does not change any conclusion.

They focus on the comparison between the coefficients of $\Delta cash_{i,t} \times dcash_{i,t-1}$ and $\Delta cash_{i,t} \times fcash_{i,t-1}$. In the original model of Faulkender and Wang (2006), the coefficient of $\Delta cash_{i,t} \times dcash_{i,t-1}$ is negative due to the agency costs of free cash flow.²¹ CDKS decompose this interaction into $\Delta cash_{i,t} \times dcash_{i,t-1}$ and $\Delta cash_{i,t} \times fcash_{i,t-1}$, and argue that a more negative coefficient on the latter will support the idea that foreign cash is valued less than domestic cash.

A closer look at this specification, however, reveals that it does not answer how foreign cash is valued relative to domestic cash. How one dollar of domestic or foreign cash translates to market value is measured by the coefficients of $\Delta dcash_{i,t}$ and $\Delta fcash_{i,t}$, not by the coefficients of $\Delta cash_{i,t} \times dcash_{i,t-1}$ and $\Delta cash_{i,t} \times fcash_{i,t-1}$. The coefficients of $\Delta cash_{i,t} \times dcash_{i,t-1}$ and $\Delta cash_{i,t} \times fcash_{i,t-1}$ do not have a clear meaning. If $\Delta cash_{i,t}$ is one dollar, does this one dollar change come from domestic or foreign operations? Suppose the coefficient of $\Delta cash_{i,t} \times fcash_{i,t-1}$ is negative, and suppose $\Delta cash_{i,t}$ is all attributed to the change in domestic cash. Then why would the change in domestic cash's effect on market value depend on the existing foreign cash stock? I estimate this specification for the sake of completeness.

Although $\Delta cash_{i,t} \times dcash_{i,t-1}$ and $\Delta cash_{i,t} \times fcash_{i,t-1}$ do not have an intuitive meaning, $\Delta dcash_{i,t} \times dcash_{i,t-1}$ and $\Delta fcash_{i,t} \times fcash_{i,t-1}$ do – they essentially condition the value of one additional dollar of domestic and foreign cash on the existing domestic and foreign cash stock, so they measure the marginal value of domestic and foreign cash, respectively. Therefore, I break *cash* into *dcash* and *fcash* everywhere in model (4). The model is:

²¹ The idea is that if the lagged cash holdings are already high, one extra dollar of cash is not going to be invested in positive NPV projects and might end up being wasted on managers' empire-building, so this one dollar is worth less than one dollar.

$$\begin{aligned}
ar_{i,t} = & \alpha_0 + \alpha_1 \Delta dcash_{i,t} + \alpha_2 \Delta fcash_{i,t} + \alpha_3 \Delta domearnings_{i,t} + \alpha_4 \Delta forearnings_{i,t} + \\
& \alpha_5 \Delta netassets_{i,t} + \alpha_6 \Delta rd_{i,t} + \alpha_7 \Delta interest_{i,t} + \alpha_8 \Delta dividends_{i,t} + \alpha_9 dcash_{i,t-1} + \\
& \alpha_{10} fcash_{i,t-1} + \alpha_{11} lev_{i,t} + \alpha_{12} netfinancing_{i,t} + \alpha_{13} \Delta dcash_{i,t} \times dcash_{i,t-1} + \\
& \alpha_{14} \Delta fcash_{i,t} \times fcash_{i,t-1} + \alpha_{15} \Delta dcash_{i,t} \times lev_{i,t} + \alpha_{16} \Delta fcash_{i,t} \times lev_{i,t} + \\
& \alpha_{17} \log_assets_{i,t} + \alpha_{18} Mills + industry FEs + year FEs + \varepsilon_{i,t} \quad (5)
\end{aligned}$$

In this model, the comparison between α_1 and α_2 shows on average how foreign cash and domestic cash are valued, and the comparison between α_{14} and α_{15} shows what the marginal value of foreign cash is relative to the marginal value of domestic cash.

The final variation I make to the model is to split $\Delta cash$ into $\Delta dcash$ and $\Delta fcash$ in CDKS and Thakor's model (model 4 above).²² Besides the comparison between the coefficients of $\Delta dcash_{i,t} \times dcash_{i,t-1}$ and $\Delta fcash_{i,t} \times fcash_{i,t-1}$ they examine, I can also examine the coefficients of $\Delta dcash$ and $\Delta fcash$ in the same model:

$$\begin{aligned}
ar_{i,t} = & \alpha_0 + \alpha_1 \Delta dcash_{i,t} + \alpha_2 \Delta fcash_{i,t} + \alpha_3 dcash_{i,t-1} + \alpha_4 fcash_{i,t-1} + \alpha_5 \Delta dcash_{i,t} \times dcash_{i,t-1} + \\
& \alpha_6 \Delta fcash_{i,t} \times fcash_{i,t-1} + \alpha_7 \Delta domearnings_{i,t} + \alpha_8 \Delta forearnings_{i,t} + \alpha_9 \Delta netassets_{i,t} + \\
& \alpha_{10} \Delta rd_{i,t} + \alpha_{11} \Delta interest_{i,t} + \alpha_{12} \Delta dividends_{i,t} + \alpha_{13} lev_{i,t} + \alpha_{14} netfinancing_{i,t} + \\
& \alpha_{15} \Delta dcash_{i,t} \times lev_{i,t} + \alpha_{16} \log_assets_{i,t} + \alpha_{17} Mills + industry FEs + year FEs + \varepsilon_{i,t} \quad (6)
\end{aligned}$$

5.2 Main Results

In Table 5, column 1 reports the result of estimating model 3. The coefficient of $\Delta dcash_{i,t}$ is 1.211, and the coefficient of $\Delta fcash_{i,t}$ is a slightly bigger 1.236, but the coefficients are not significantly different from each other. This result suggests that on average foreign cash is valued similarly to domestic cash. It appears that the positive effect of high growth opportunities cancels out the negative effects of the repatriation tax and the agency problem.

²² The downside of model 5 is that there are many interactions involving domestic and foreign cash. Domestic cash and foreign cash are highly correlated both in level and change forms, and so are the interactions involving them. Therefore, I use model 3 in the following tests with respect to cross-sectional variation in firms' characteristics.

CDKS and Thakor's specification (model 4) is in column 2. I find results consistent with CDKS and inconsistent with Thakor – the coefficient of $\Delta cash_{i,t} \times fcash_{i,t-1}$ is significantly more negative than $\Delta cash_{i,t} \times dcash_{i,t-1}$ at 1% level. The fact that I can replicate CDKS' result using my sample and their specification makes an important point: although my sample is relatively small, the test still has power. The difference between my conclusion using model 3 and CDKS' conclusion using model 4 can only be attributed to the specification.

Column 3 of Table 5 reports the results of model 5. I find the negative coefficient of $\Delta cash_{i,t} \times fcash_{i,t-1}$ in CDKS' regression actually captures the effect of $\Delta fcash_{i,t} \times fcash_{i,t-1}$. The negative coefficient of $\Delta fcash_{i,t} \times fcash_{i,t-1}$ indicates that when foreign subsidiaries have already accumulated a lot of cash, one extra dollar of foreign cash is not going to add much value to the firm, presumably because it is more likely to be abused. Holding a lot of foreign cash indicates that these subsidiaries have not found investment opportunities, arguably the very reason that could make foreign cash more valuable than domestic cash. $\Delta fcash_{i,t} \times fcash_{i,t-1}$ (or in CDKS' case, $\Delta cash_{i,t} \times fcash_{i,t-1}$), however, does not tell us *on average* how foreign cash is valued relative to domestic cash. In this specification, the coefficient of $\Delta fcash_{i,t}$, 2.054, is actually weakly different from the coefficient of $\Delta dcash_{i,t}$, 0.869. Foreign cash is by no means discounted relative to domestic cash *on average*.

The last column shows the result of model 6. $\Delta fcash_{i,t}$ has a bigger, albeit insignificantly different, coefficient than $\Delta dcash_{i,t}$, reaffirming what has been found so far. The coefficient of $\Delta cash_{i,t} \times fcash_{i,t-1}$ is still significantly more negative than $\Delta cash_{i,t} \times dcash_{i,t-1}$.

Consistent with prior literature, in all the models $\Delta forearnings_{i,t}$ is significantly positive and has coefficient larger than 1, but $\Delta domearnings_{i,t}$ is never significantly different from 0. Along

with the comparison between coefficients of $\Delta f_{cash_{i,t}}$ and $\Delta d_{cash_{i,t}}$, there is no evidence suggesting investors discount any aspect of foreign operations.

Overall, the results show that the benefits of keeping cash offshore must be significant enough to counterbalance the downsides. The results are also consistent with an efficient internal capital market where the value of cash does not depend on its location. The agency problem does reveal itself when foreign investment opportunities are limited and firms are simply hoarding foreign cash, causing the marginal value of foreign cash to be lower than domestic cash.

5.3 Firms' Characteristics and the Valuation of Foreign Cash Holdings

This section explores the cross-sectional variation in firms' characteristics that affect the value of foreign cash differently than domestic cash, including the repatriation tax, the agency problem of foreign operations and foreign growth opportunities. I expand model 3 as follows:

$$\begin{aligned}
 ar_{i,t} = & \alpha_0 + \alpha_1 \Delta d_{cash_{i,t}} + \alpha_2 \Delta f_{cash_{i,t}} + \alpha_3 characteristic_{i,t} + \alpha_4 \Delta d_{cash_{i,t}} \times characteristic_{i,t} + \\
 & \alpha_5 \Delta f_{cash_{i,t}} \times characteristic_{i,t} + \alpha_6 \Delta domearnings_{i,t} + \alpha_7 \Delta forearnings_{i,t} + \alpha_8 \Delta netassets_{i,t} + \\
 & \alpha_9 \Delta rd_{i,t} + \alpha_{10} \Delta interest_{i,t} + \alpha_{11} \Delta dividends_{i,t} + \alpha_{12} cash_{i,t-1} + \alpha_{13} lev_{i,t} + \alpha_{14} netfinancing_{i,t} + \\
 & \alpha_{15} \Delta cash_{i,t} \times cash_{i,t-1} + \alpha_{16} \Delta cash_{i,t} \times lev_{i,t} + \alpha_{17} \log_assets_{i,t} + \alpha_{18} Mills + \\
 & \text{industry FEs} + \text{year FEs} + \varepsilon_{i,t}
 \end{aligned} \tag{7}$$

$characteristic_{i,t}$ is one of the firm characteristics detailed below. The coefficient of interest is α_5 .

5.3.1 The Repatriation Tax

The first measure of the repatriation tax is firms' nonbinding foreign tax credit status. The variable, *nonbinding*, is equal to 1 if firms' estimated foreign tax rate is less than the U.S. statutory tax rate 35% and 0 otherwise.²³ Foreign tax rate is the average of foreign income tax/foreign pretax

²³ Foreign income can sometimes be negative. I follow prior literature and truncate the calculated foreign tax rate at zero and one.

income over 1 and up to 5 years.²⁴ The second measure is the indicator variable, *taxdisclosure*, for voluntary disclosure of the repatriation tax in 10-K filings. The test variable is $\Delta fcash_{i,t} \times nonbinding_{i,t}$ or $\Delta fcash_{i,t} \times taxdisclosure_{i,t}$. If the repatriation tax affects the valuation of foreign cash holdings (either through the tax channel or through the investment distortion channel), and the two proxies can accurately reflect the extent of the repatriation tax, α_5 will be negative. I do not expect the valuation of domestic cash holdings to depend on the repatriation tax, i.e., α_4 is expected to be insignificant.

Table 6 reports the results. In the first column, the interaction $\Delta fcash_{i,t} \times nonbinding_{i,t}$ is positive but insignificant, and surprisingly, the interaction $\Delta dcash_{i,t} \times nonbinding_{i,t}$ is significantly positive. This pattern also holds true in the second column where *taxdisclosure_{i,t}* is the proxy for the repatriation tax. Both $\Delta dcash_{i,t} \times taxdisclosure_{i,t}$ and $\Delta fcash_{i,t} \times taxdisclosure_{i,t}$ are significantly positive. Neither proxy generates the expected negative coefficient. These results are inconsistent with the conclusion of Chen (2014), who finds that the valuation of *total* cash holdings decreases in the repatriation tax. One likely explanation is that neither *nonbinding_{i,t}* nor *taxdisclosure_{i,t}* captures only the repatriation tax. The result in the second column implies that firms who voluntarily disclose the repatriation tax are more transparent in general, such that their cash holdings, domestic or foreign, are valued higher. Huang and Zhang (2012) also find total cash holdings are more valuable for more transparent firms, using AIMR score to measure transparency. The insignificant coefficient of $\Delta fcash_{i,t} \times nonbinding_{i,t}$ might indicate that the repatriation tax status cannot be accurately estimated. It might also indicate that the repatriation tax status is

²⁴ Using the current year's estimated foreign tax rate does not change the results. Sometimes the estimated foreign tax rate is bigger than 35% but the firm actually discloses its expected repatriation tax in the 10-K filings. I will change nonbinding from 0 to 1 when this is the case. Using (35%-foreign tax rate) rather than the indicator variable *nonbinding* generates similar results.

correlated with other institutional factors of low-tax foreign countries that can offset the negative effect of the repatriation tax on foreign cash.

5.4 The Agency Problem of Foreign Operations

I assess the agency problem of foreign operations through three aspects – the disclosure, the organizational complexity, and the location of decision-rights. The degree to which firms hide foreign subsidiaries from investors is used to measure the disclosure aspect of foreign operations. I use two variables that require different levels of reasoning from investors. The first variable, $noex21_{i,t}$, is an indicator variable equal to 1 if the firm does not mention foreign subsidiaries in Exhibit 21 or does not file Exhibit 21. This variable does not demand too much of investors' ability to know the truth about the actual number of foreign subsidiaries because not showing any foreign subsidiaries is very likely to indicate firms are withholding information.²⁵ The second variable asks more from investors. I extract foreign subsidiaries from the OSIRIS international database and use this information as a proxy for all significant foreign operations. OSIRIS collects foreign subsidiaries through different countries' company registries, because even private firms like subsidiaries need to register with a foreign local registry. This is not a perfect proxy, however, because the comprehensiveness of foreign subsidiaries depends on data provider's data collection ability.²⁶ Some subsidiaries in OSIRIS are not really firms, such as foundations, research institutes and pension funds. I delete all these observations, and other subsidiaries not controlled by the U.S. parent (i.e., ownership is below 50%). The OSIRIS database is also not a complete panel; the current version identifies foreign subsidiaries on varying dates, from 2010-2014. The program I use on Exhibit 21 can only count country names, and cannot accurately count the number of foreign

²⁵ I only keep firms with positive PRE in my sample, so all of them should have at least some significant foreign operations.

²⁶ There are some cases where firms disclose more foreign subsidiaries in Exhibit 21 than the OSIRIS database.

subsidiaries because often a country name appears in subsidiary name once and in location once. I therefore count the number of unique foreign countries in OSIRIS and Exhibit 21, and decide whether firms choose to underreport foreign subsidiaries by comparing these two. To facilitate comparison, I count the number of foreign countries in Exhibit 21 of fiscal year 2010 through 2013 combined. If the number in Exhibit 21 is lower than the number in OSIRIS, the indicator variable, $hide_i$, is set to 1. Although not perfect, this measure does pick up the cases where rather sizable firms only report very few foreign subsidiaries.

The next variable, $forcountries_{i,t}$, measures the organizational complexity. $forcountries_{i,t}$ is the number of distinct foreign countries where firms have significant operations.²⁷ The last variable, $central_{i,t}$, measures the agency problem within multinational firms. Following Robinson and Stocken (2013), the decision-rights are considered decentralized if foreign subsidiaries use the local currency rather than the U.S. dollar as the functional currency. Such practice will result in non-zero translation adjustment in accumulated comprehensive income, and the consolidated translation adjustment is the change in COMPUSTAT item RECTA. Firms with zero change in RECTA are considered having centralized decision-rights, with $central_{i,t}$ equal to 1.

Table 7 reports the results. In the first column, the proxy is $noex21_{i,t}$. As predicted in hypothesis 3, the interaction between $noex21_{i,t}$ and $\Delta fcash_{i,t}$ is significantly negative, and the interaction between $noex21_{i,t}$ and $\Delta dcash_{i,t}$ is not significant. The caveat here is that my sample is relatively small, and only 4% of the sample fails to report any foreign subsidiaries. The coefficient of $\Delta fcash_{i,t} \times noex21_{i,t}$, -2.013, is rather negative, and the coefficient on $\Delta fcash_{i,t} + \Delta fcash_{i,t} \times noex21_{i,t}$ is not significantly different from 0. The magnitude basically says

²⁷ I use the number of foreign countries disclosed in Exhibit 21 rather than the number of foreign countries reported in the OSIRIS database because the former is what investors actually have. Another reason is the OSIRIS data are cross-sectional with subsidiaries identified at different times between 2010 and 2014. Using the number of foreign countries in the OSIRIS generates qualitatively similar results.

foreign cash has no value if firms do not disclose any foreign subsidiaries in Exhibit 21. The second proxy for disclosure $hide_i$ is in the second column. The coefficient on $\Delta fcash_{i,t} \times hide_i$ is significantly negative and the coefficient on $\Delta fcash_{i,t} + \Delta fcash_{i,t} \times hide_i$ is not significantly different from 0. Almost 30% of firms are identified as underreporting foreign subsidiaries according to this variable, so this result reinforces the finding in the first column. In the third column, the test variable is $forcountries_{i,t}$. The interaction $\Delta fcash_{i,t} \times forcountries_{i,t}$ is negative, as predicted at the 10% percent level. The coefficient suggests that if the firm operates in one more foreign country, one dollar in foreign cash loses 5 cents in value in the eyes of investors. In the last column, the agency problem proxy is the location of decision-rights, $central_{i,t}$. The interaction $\Delta fcash_{i,t} \times central_{i,t}$ is significantly positive and the interaction $\Delta dcash_{i,t} \times central_{i,t}$ is insignificant. Foreign cash in firms with centralized decision-rights is valued twice as high as foreign cash in decentralized firms.

5.5 Foreign Growth Opportunities

The main results in Table 5 imply that foreign growth opportunities must be significant. This section explicitly explores the effect of foreign growth opportunities on the valuation of foreign cash holdings. The majority of multinational firms reports geographic segment sales. I use sales growth in non-U.S. segments to measure foreign growth opportunities. I also calculate sales growth in U.S. segments, and use it as a placebo test because presumably the valuation of foreign cash holdings should not vary with domestic growth opportunities. I expect α_5 to be positive when $characteristic_{i,t}$ is foreign growth, $forgrowth_{i,t}$, and insignificant when $characteristic_{i,t}$ is domestic growth, $domgrowth_{i,t}$.

Table 8 presents the results. In the first column, the interaction $\Delta fcash_{i,t} \times forgrowth_{i,t}$ is highly significant at 1% level. The coefficient of $\Delta fcash_{i,t} \times forgrowth_{i,t}$ indicates 1% foreign sales

growth is associated with 5 cents additional value for each foreign dollar. Interestingly, $\Delta dcash_{i,t} \times forgrowth_{i,t}$ is also significantly positive at 5% level, although the coefficient is smaller than $\Delta fcash_{i,t} \times forgrowth_{i,t}$. Desai et al. (2009) find that investment in foreign subsidiaries stimulates investment in domestic operations. The positive coefficient on $\Delta dcash_{i,t} \times forgrowth_{i,t}$ seems to suggest that higher foreign growth opportunities benefit the U.S. as well, making domestic cash holdings more valuable. When I replace $forgrowth_{i,t}$ with $domgrowth_{i,t}$ in the second column, $\Delta fcash_{i,t} \times domgrowth_{i,t}$ is insignificant as expected, but even $\Delta dcash_{i,t} \times domgrowth_{i,t}$ is insignificant. Note that $forgrowth_{i,t}$ is also significantly positive but $domgrowth_{i,t}$ is not. The results essentially suggest that investors not only value foreign growth more than domestic growth, but also condition the valuation of cash holdings on foreign growth but not on domestic growth. The descriptive statistics in Table 2, Panel B might partially explain investors' fixation on foreign growth – the average foreign sales growth is more than 11% but the average domestic sales growth is less than 5%.

6. Foreign Cash Estimates

Using the time period before firms widely disclose foreign cash holdings, Thakor (2013) and CDKS (2014) develop two rather different methods to estimate foreign cash holdings. They both use variations on model 4 above, but arrive at opposite conclusions. Since their sample selection and period are also different, it is hard to pin down the cause of the different conclusions. I apply both methods to my sample firms to eliminate the sample difference, and re-examine the valuation of the estimated foreign cash holdings. This section discusses the results.

The (unreported) Pearson correlations between Thakor's domestic and foreign cash estimates and the actual domestic and foreign cash (voluntarily disclosed) are 0.81 and 0.58, respectively. Pearson correlations between CDKS' domestic and foreign estimates and the actual

domestic and foreign cash are 0.57 and 0.56, respectively. It seems that Thakor's method provides a more accurate breakdown of total cash.

Table 9, Panel A reports the results of model 4, with Thakor's estimates in column 1 and CDKS's estimates in column 2. In column 1, neither $\Delta cash \times dcash_estimate_{i,t-1}$ nor $\Delta cash \times fcash_estimate_{i,t-1}$ is significant. The F-test shows that the two interactions are not significantly different from each other either. The results in column 2, however, are consistent with CDKS' findings – $\Delta cash \times fcash_estimate_{i,t-1}$ is significantly more negative than $\Delta cash \times dcash_estimate_{i,t-1}$. Even with the same sample and model specification, the two estimates still generate different conclusions, so the culprit has to be the methods of estimating foreign cash.

Table 9, Panel B reports the results of estimating model 3, my revised specification. Interestingly, Thakor's estimates generate the result that foreign cash is valued more than domestic cash on average, exactly Thakor (2013)'s conclusion. On the contrary, CDKS' estimates show that foreign cash and domestic cash are valued similarly on average, my main finding in Table 5 using actual foreign and domestic cash holdings.

To sum up, valuing estimated foreign cash holdings is sensitive to the estimation method. The results suggest that CDKS' estimates behave more closely as the actual values in the valuation models than Thakor's estimates, although the correlations suggest otherwise.

7. Treasury's Crackdown on Inversions and Market Reactions

Recently, the market has witnessed a new wave of inversion deals in which a U.S. firm acquires a foreign target and relocates overseas for tax purposes. U.S. multinationals are incentivized to invert to avoid paying U.S. taxes on future foreign earnings, but more importantly, they can also potentially escape the repatriation tax on existing foreign earnings (Fleischer, 2014).

Because foreign cash becomes cheaper to use for the soon-to-be inverted firms, inversions are largely funded by foreign cash.²⁸ Therefore, inversions are especially attractive to firms who have accumulated a large amount of foreign cash.

In the wake of this new trend, on September 22, 2014, the Treasury Department issued a notice of proposed regulations aimed at reducing some of the tax benefits of inversions. Treasury achieves this goal by making it much harder for inverted firms to avoid the repatriation tax on existing foreign earnings.²⁹ This regulation shock not only affects U.S. multinationals with pending inversions, but also affects other multinationals that could have considered inversions. Treasury's crackdown also signals the regulator's determination to curb repatriation tax avoidance in general. Foreign-cash-rich firms might be negatively affected by Treasury's announcement because the repatriation tax becomes harder to circumvent.

The reduced tax benefits of inversions, however, imply that the new rules will help deter deals that lack synergy (Fleischer, 2014), so Treasury's announcement might not be unequivocally bad news. Arguably, the deterrent effect is more prominent for foreign-cash-rich firms who are more likely to engage in deals purely driven by tax purposes.

I examine U.S. multinationals' market reactions to Treasury's announcement on September 22, 2014. Specifically, I separate firms who are involved in inversions and firms who are not, as the change in investors' expectations caused by Treasury's announcement is clearly different. I further split firms into high (low) foreign cash group if their foreign cash to total cash ratio is above (below) the median. Since a sizable percentage of firms does not disclose foreign cash holdings, I

²⁸ After Treasury's new rules, Medtronic decided to follow through with its acquisition of Covidien, but it would have to borrow 16 billion to finance the deal rather than using foreign cash, as it had previously planned (Mattioli and Rockoff, 2014).

²⁹ In fact, three out of the four actions in the "Fact Sheet" issued by Treasury illegalize some of the strategies inverted firms might use to avoid the repatriation tax.

put them in a separate group. Acquirers in pending inversions or firms who indicate interest in inversions are listed in Table 10, Panel A. Four of them disclose foreign cash holdings in the most recent filings, and as expected, they all have a significant amount of cash trapped overseas.

Market-adjusted returns on September 22, 2014 are reported in Panel B of Table 10.³⁰ Not surprisingly, firms related to inversions fall by -0.61%, but other multinationals unrelated to inversions also fall by a comparable -0.50%. Interestingly, the loss among multinationals not involved in inversions is significantly more negative for firms who do not disclose foreign cash holdings (-0.77%) than firms who do (-0.33%). Among the disclosers, the low foreign cash group falls by a bigger amount (-0.50%) than the high foreign cash group (-0.17%), although the difference is not statistically significant. Assuming that the non-disclosers on average have lower foreign cash holdings than the disclosers, this pattern essentially says that multinationals with higher foreign cash holdings lose less from Treasury's crackdown. The results together suggest that the market interprets the regulation shock as a more general signal to curb tax avoidance on foreign cash, since all the multinationals suffer losses. Firms with high foreign cash holdings suffer less, although they are more likely to consider inversions. A possible explanation is that Treasury's new rules help prevent these firms from engaging in deals only designed to avoid taxes.³¹

8. Conclusion

U.S. multinational firms hold over half their cash in foreign countries, presumably because bringing back foreign earnings triggers the repatriation tax. This phenomenon stokes heated discussions among policy makers on whether the current tax code distorts corporate investments

³⁰ Because the event is rather recent and CRSP has not been updated to this date, I calculate returns from stock prices collected from Yahoo Finance. Market returns are returns on S&P 500 index.

³¹ Salix Pharmaceuticals cancelled merger with Cosmo Technologies on October 3, 2014, blaming Treasury's new move. Its stock rose by 1.1% that day (S&P 500 also rose by 1.1%). AbbVie announced that its board was weighing the impact of Treasury rules and reconsidering the deal with Shire on October 15, 2014. AbbVie's stock rose by 0.9% (S&P 500 fell by 0.81%).

and therefore needs an overhaul. If the concern is valid, it implies that the stockpiles of foreign cash have a negative effect on U.S. multinationals. Firms, however, could also hold cash in foreign countries because growth opportunities are better abroad. The SEC has recently started urging some firms to disclose foreign cash holdings, and I find that bigger firms with weaker corporate governance, lower growth opportunities and larger scope of foreign operations are more likely to become the SEC's targets. The comments prompt not only the recipients to disclose, but also trigger disclosure by their industry peers. As of fiscal year 2013, almost 68% of the U.S. multinational firms disclose foreign cash in the 10-K filings.

Among firms who disclose domestic and foreign cash holdings separately, I examine the valuation of foreign cash holdings. I find that *on average* foreign cash is valued similarly to domestic cash. I do find that the *marginal value* of foreign cash is less than domestic cash, indicating a more severe agency problem for foreign operations. Foreign cash is less valuable when the disclosure of foreign operations is lacking and when foreign operations are more complex, but more valuable when the U.S. parent has tighter control over foreign subsidiaries. Highlighting the importance of foreign growth opportunities, firms with faster-growing foreign segments have more valuable foreign cash holdings.

Overall, the results suggest that foreign cash holdings are only a concern when investors have limited control over them. With effective monitoring and disclosure of foreign operations, keeping cash offshore in the presence of high foreign growth opportunities can benefit the U.S. multinational firms.

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Appendix 1
Variable Definition

Variables for Valuation of Cash Holdings Tests	
ar	The firm's buy-and-hold return during year t minus the buy-and-hold return of corresponding Fama-French 25 portfolios to which the firm belongs to during year t.
dcash	Domestic cash holdings scaled by market value of equity at the beginning of year t. Domestic cash is collected from 10-K filings.
fcash	Foreign cash holdings scaled by market value of equity at the beginning of year t. Foreign cash is collected from 10-K filings.
cash	Total cash holdings scaled by market value of equity at the beginning of year t. Cash is CHE.
domearnings	Domestic earnings scaled by market value of equity at the beginning of year t. Domestic earnings are the difference between earnings before extraordinary items and foreign earnings. Earnings before extraordinary items are (IB+XINT+TXDI+ITCI), and foreign earnings are defined below.
forearnings	Foreign earnings scaled by market value of equity at the beginning of year t. Foreign earnings are (PIFO-TXFO-TXDFO).
netassets	Net assets scaled by market value of equity at the beginning of year t. Net assets are total assets net of cash, (AT-CHE).
rd	R&D expense scaled by market value of equity at the beginning of year t. R&D expense is XRD, and it is set to zero if XRD is missing.
interest	Interest expense scaled by market value of equity at the beginning of year t. Interest expense is XINT.
dividends	Common dividends scaled by market value of equity at the beginning of year t. Common dividends are DVC.
lev	Market leverage calculated as debt to sum of debt and market value of equity (debt/(PRCC_F*CSHO+ debt)). Debt equals sum of short-term and long-term debt. debt=DLTT+DLC.
netfinancing	Net financing calculated as sum of new equity issues and new debt issues. New equity issues are (SSTK-PRSTKC). New debt issues are (DLTIS-DLTR).
log_assets	Log of total assets. Total assets are AT.
noex21	Indicator variable equal to 1 if the firm does not mention foreign subsidiaries in its Exhibit 21 or does not file an Exhibit 21, and 0 otherwise.
hide	Indicator variable equal to 1 if the firm underreports foreign subsidiaries in its Exhibit 21 and 0 otherwise. Whether the firms underreports foreign subsidiaries is determined as follows: I first extract foreign subsidiaries from OSIRIS international database. I delete all the foreign subsidiaries that are not firms (foundation, research institute, pension fund etc.) and not owned by the parent by at least 50%. I count the number of unique foreign countries the firm operates in. I then count the number of unique foreign countries the firm reports in its Exhibit 21 from 2010 to 2013 (because OSIRIS data is not a panel and the date when foreign subsidiaries are identified varies from calendar year 2010 to 2014). If the number of unique foreign countries in Exhibit 21 is smaller than the number of unique foreign countries in OSIRIS, the firm is considered underreporting foreign subsidiaries. The number of foreign countries is used instead of the number of foreign subsidiaries because my Perl program can only count how many times a certain country name appears in a text file. Exhibit 21 usually has two columns: subsidiary name and location. If the foreign subsidiary is called Sears Canada and its location is Canada, the word Canada will be counted twice even though there is only one Canadian subsidiary.
forcountries	Number of foreign countries the firm operates in. Foreign countries are extracted from Exhibit 21.

central	Indicator variable equal to 1 if the U.S. parent of the multinational firm controls its foreign subsidiaries' decision-rights, and 0 otherwise. Foreign subsidiaries are considered to have their own decisions-rights if they use the local currency as the functional currency instead of U.S. dollar. When foreign subsidiaries use the local currency, the translation adjustment in accumulated comprehensive income will be non-zero. Translation adjustment is the change in RECTA in COMPUSTAT.
forgrowth	Sales growth rate for foreign segments, calculated as $\sqrt[n]{\frac{Sales_t}{Sales_{t-n}}} - 1$, where n is equal to 1 to 5 depending on the length of the time series. Sales for foreign segments are from COMPUSTAT Segment file.
domgrowth	Sales growth rate for the U.S. segments, calculated as $\sqrt[n]{\frac{Sales_t}{Sales_{t-n}}} - 1$, where n is equal to 1 to 5 depending on the length of the time series. Sales for the U.S. segments are from COMPUSTAT Segment file.
nonbinding	Indicator variable that equals 1 if the firm's foreign tax rate is lower than the U.S. statutory tax rate 35%, and 0 otherwise. Foreign tax rate is calculated as the 1 to 5 years' average of foreign income tax to foreign income (TXFO/PIFO), depending on the length of the time series.
taxdisclosure	Indicator variable that equals 1 if the firm discloses the repatriation tax, and 0 otherwise.
Variables for Disclosure Determinant Model	
disclosure1	Indicator variable for quantitative disclosure. It equals one if the firm discloses the exact foreign cash balances in year t, and 0 otherwise.
disclosure2	Indicator variable for quantitative and qualitative disclosure. It equals one if the firm either discloses the exact foreign cash balances or qualitatively describe the extent of foreign cash holdings in year t, and 0 otherwise.
fcashcomment	Indicator variable that equals 1 if the firm receives a comment from the SEC that urges the firm to disclose its foreign cash holdings, and 0 otherwise.
commentbefore	Indicator variable that equals 1 if the firm's foreign cash issue in the filings of previous years is commented on by the SEC.
weak	Indicator variable that equals 1 if the firm's internal control has material weakness, and 0 otherwise.
restatement	Indicator variable that equals 1 if the firm restates its earnings, and 0 otherwise.
highvol	Indicator variable that equals 1 if the firm's monthly stock return volatility is above the sample median, and 0 otherwise.
size	Log of market value of equity ($\log(\text{PRCC_F} * \text{CSHO})$).
age	Log of the firm's age as of the fiscal year end of year t. Firm i's age is the number of years since the first time the firm appears in CRSP.
roa	Income before extraordinary items to total assets (IB/AT).
bus_segments	Number of business segments.
geo_segments	Number of geographic segments.
tobinq	Market value of equity plus total liabilities divided by total assets ($(\text{PRCC_F} * \text{CSHO} + \text{LT}) / \text{AT}$).
salesgrowth	Growth in total sales calculated as $\sqrt[n]{\frac{Sales_t}{Sales_{t-n}}} - 1$, where n is equal to 1 to 5 depending on the length of the time series.
ma	Indicator variable that equals 1 if the firm is involved in a merger or acquisition (non-zero AQP), and 0 otherwise.
restructuring	Indicator variable that equals 1 if the firm has non-zero restructuring costs (RCP), and 0 otherwise.
extfinancing	External financing defined as the sum of equity and debt financing scaled by total assets. Equity financing=sales of common and preferred stock-purchases of common stock-

	dividends (SSTK-PRSTKC-DV). Debt financing=long-term debt issuance-long-term debt reduction-change in current debt (DLTIS-DLTR-DLCCH).
litigation	Indicator variable that equals 1 if the firm is in a high litigation risk industry, and 0 otherwise. High litigation risk industries are defined by SIC codes 2833-2836, 3570-3577, 3600-3674, 5200-5961 or 7370-7374).
big4	Indicator variable that equals 1 if the firm has a Big 4 auditor in year t, and 0 otherwise.
institution	Institutional ownership before fiscal year end of year t, from Thomson Reuters 13f database.
analysts	Log(1+the number of analysts following the firm during year t). The number of analysts is collected from I/B/S/E, and firms not covered by I/B/S/E are assumed to have no analyst.
duality	Indicator variable that equals 1 if the firm's CEO is also its chairman of the board of directors, and 0 otherwise.
totalcash	Total cash to total assets (CHE/AT).
pre	Permanently reinvested earnings to total assets. Permanently reinvested earnings are collected from 10-K filings.
freecashflow	Free cash flow to total assets. Free cash flow is operating cash flow minus cash dividends (OANCF-DV).
rnd	R&D expense divided by sales (XRD/SALE). Missing value of XRD is set to zero.

Table 1
Domestic and Foreign Cash Holding Disclosure across Years

Panel A: Disclosure rate and the comments on foreign cash by the SEC

Fiscal Year	No. of Disclosed Firms	No. of Total Firms	Disclosure Rate	No. of Comments	Comment Rate^a
2010	102	836	12.20%	92	12.53%
2011	405	834	48.56%	41	9.56%
2012	554	905	61.22%	14	4.00%
2013	270	400	67.50%	1	N/A ^b

a. Comment Rate=No. of Comments/(No. of Total Firms-No. of Disclosed Firms).

b. All the information is as of March 28, 2014, so the SEC's review process for fiscal year 2013 is incomplete.

Panel B: Descriptive statistics for hand-collected data from 10-K filings

Variable	N	Min	Q1	Mean	Median	Q3	Max	Std. dev.
Domestic Cash	1331	0	27.4	708	123	414	63,751	2,665
Domestic Cash/TA	1331	0	0.017	0.103	0.063	0.14	0.828	0.121
Foreign Cash	1331	0	46.6	1232	167	572	69,620	4,823
Foreign Cash/TA	1331	0	0.032	0.104	0.073	0.144	0.720	0.099
Foreign/Total	1331	0	0.317	0.557	0.572	0.805	1.000	0.287
PRE	2975	0.1	34.6	1891	186	853	108,000	6,806
PRE/TA	2975	0	0.036	0.154	0.107	0.23	0.916	0.15
Repatriated Tax	443	0	5.8	642	40	251	24,400	2,291
Repatriated Tax/TA	443	0	0.003	0.037	0.019	0.056	0.198	0.046

Table 2
Descriptive Statistics

Panel A: Descriptive statistics for the SEC's comment decision and the firms' disclosure decision

Variable	N	Min	Q1	Mean	Median	Q3	Max	Std. dev.
disclosure1	2975	0.000	0.000	0.447	0.000	1.000	1.000	0.497
disclosure2	2975	0.000	0.000	0.478	0.000	1.000	1.000	0.500
fcashcomment	1644	0.000	0.000	0.090	0.000	0.000	1.000	0.286
commentbefore	2975	0.000	0.000	0.107	0.000	0.000	1.000	0.309
peercomment	2975	0.000	0.000	0.604	1.000	1.000	1.000	0.489
weakness	2975	0.000	0.000	0.029	0.000	0.000	1.000	0.167
restatement	2975	0.000	0.000	0.050	0.000	0.000	1.000	0.218
highvol	2975	0.000	0.000	0.496	0.000	1.000	1.000	0.500
size	2975	1.658	6.523	7.718	7.679	8.873	13.348	1.797
age	2975	0.220	2.597	2.996	3.013	3.685	4.489	0.850
roa	2975	-0.976	0.025	0.051	0.056	0.091	0.480	0.086
bus_segments	2975	1.000	1.000	2.556	2.000	4.000	10.000	1.831
geo_segments	2975	1.000	2.000	4.215	4.000	5.000	29.000	2.770
tobinq	2975	0.446	1.217	1.909	1.580	2.183	13.798	1.119
salesgrowth	2975	-0.807	0.009	0.112	0.078	0.179	4.645	0.220
ma	2975	0.000	0.000	0.406	0.000	1.000	1.000	0.491
restructuring	2975	0.000	0.000	0.527	1.000	1.000	1.000	0.499
extfinancing	2975	-0.581	-0.064	-0.020	-0.021	0.012	0.966	0.102
litigation	2975	0.000	0.000	0.346	0.000	1.000	1.000	0.476
big4	2975	0.000	1.000	0.919	1.000	1.000	1.000	0.273
institution	2975	0.001	0.656	0.754	0.804	0.909	1.000	0.207
analysts	2975	0.000	1.609	2.211	2.303	2.833	4.025	0.841
duality	2975	0.000	0.000	0.496	0.000	1.000	1.000	0.500
totalcash	2975	0.001	0.066	0.190	0.144	0.269	0.897	0.161
pre	2975	0.000	0.036	0.154	0.107	0.229	0.916	0.150
taxdisclosure	2975	0.000	0.000	0.149	0.000	0.000	1.000	0.356
nonbinding	2975	0.000	0.000	0.711	1.000	1.000	1.000	0.453
freecashflow	2975	-0.553	0.050	0.085	0.083	0.123	0.746	0.074
rnd	2975	0.000	0.000	0.058	0.018	0.088	1.831	0.091

Panel B: Descriptive statistics for valuation models

Variable	N	Min	Q1	Mean	Median	Q3	Max	Std. dev.
ar	544	-0.714	-0.184	0.012	0.001	0.149	3.818	0.342
Δ cash	544	-0.525	-0.020	0.006	0.009	0.037	0.453	0.080
Δ dcash	544	-0.501	-0.024	-0.004	0.000	0.020	0.281	0.067
Δ fcash	544	-0.246	-0.005	0.010	0.007	0.024	0.413	0.051
Δ domearnings	544	-0.922	-0.011	0.003	0.001	0.013	0.723	0.089
Δ forearnings	544	-0.379	-0.008	-0.002	0.001	0.007	0.665	0.052
Δ netassets	544	-1.126	-0.005	0.051	0.034	0.089	1.638	0.191
Δ rd	544	-0.089	0.000	0.002	0.001	0.004	0.069	0.010
Δ interest	544	-0.051	-0.001	0.001	0.000	0.001	0.198	0.012
Δ dividends	544	-0.426	0.000	0.004	0.000	0.002	0.440	0.036
cash _{t-1}	544	0.003	0.078	0.189	0.143	0.237	1.346	0.175
dcash _{t-1}	544	0.000	0.018	0.093	0.053	0.116	1.115	0.126
fcash _{t-1}	544	0.000	0.033	0.096	0.067	0.122	0.652	0.096
lev	544	0.000	0.040	0.151	0.120	0.227	0.781	0.141
netfinancing	544	-0.635	-0.042	-0.002	-0.011	0.011	0.907	0.113
log_assets	544	3.435	6.932	8.040	8.014	9.140	12.222	1.600
noex21	544	0.000	0.000	0.039	0.000	0.000	1.000	0.193
hide	544	0.000	0.000	0.285	0.000	1.000	1.000	0.452
forcountries	523	1.000	8.000	20.532	17.000	29.000	94.000	16.563
central	523	0.000	0.000	0.057	0.000	0.000	1.000	0.233
forgrowth	448	-0.327	0.012	0.114	0.064	0.131	9.198	0.472
domgrowth	448	-0.500	-0.005	0.046	0.040	0.083	1.557	0.145
nonbinding	544	0.000	0.000	0.724	1.000	1.000	1.000	0.447
taxdisclosure	544	0.000	0.000	0.176	0.000	0.000	1.000	0.382

Table 3
Determinants of the SEC's Comment Decision

Variable	All Years (1)	Exclude Year 2013 (2)	All Years (3)	Exclude Year 2013 (4)
weakness	0.035 [0.929]	0.037 [0.905]	0.033 [0.903]	0.035 [0.888]
restatement	0.037 [1.619]	0.04 [1.626]	0.039* [1.710]	0.043* [1.743]
highvol	0.016 [0.992]	0.019 [1.073]	0.018 [1.096]	0.021 [1.201]
size	0.064*** [4.076]	0.070*** [4.127]	0.060*** [3.735]	0.066*** [3.814]
age	-0.008 [-0.966]	-0.009 [-1.014]	-0.011 [-1.250]	-0.012 [-1.308]
roa	0.002 [0.269]	0.002 [0.221]	-0.003 [-0.345]	-0.004 [-0.439]
bus_segments	-0.018** [-2.474]	-0.020** [-2.562]	-0.015** [-2.021]	-0.017** [-2.092]
geo_segments	0.006 [1.098]	0.007 [1.126]	0.004 [0.761]	0.005 [0.772]
tobinq	-0.019* [-1.888]	-0.021* [-1.915]	-0.022* [-1.895]	-0.024* [-1.932]
salesgrowth	-0.016* [-1.761]	-0.017* [-1.790]	-0.014 [-1.618]	-0.016* [-1.647]
ma	-0.025* [-1.647]	-0.025 [-1.523]	-0.021 [-1.358]	-0.02 [-1.222]
restructuring	0.022 [1.531]	0.022 [1.418]	0.019 [1.346]	0.018 [1.216]
extfinancing	-0.001 [-0.163]	-0.001 [-0.102]	-0.001 [-0.197]	-0.001 [-0.150]
litigation	0.013 [0.754]	0.011 [0.550]	0.012 [0.674]	0.009 [0.453]
big4	-0.014 [-0.510]	-0.016 [-0.542]	-0.01 [-0.381]	-0.011 [-0.409]
institution	0.012 [1.445]	0.013 [1.395]	0.012 [1.477]	0.013 [1.425]
analysts	-0.006 [-0.466]	-0.007 [-0.455]	-0.005 [-0.346]	-0.005 [-0.363]
duality	0.001 [0.054]	0.003 [0.228]	-0.006 [-0.445]	-0.004 [-0.281]
totalcash			0.005 [0.576]	0.006 [0.645]
pre			0.022*** [3.498]	0.024*** [3.534]
taxdisclosure			-0.041* [-1.828]	-0.044* [-1.831]
nonbinding			0.013 [0.779]	0.017 [0.979]
Industry & Year FE	Yes	Yes	Yes	Yes
Observations	1644	1513	1644	1513
Pseudo R-square	15.36%	14.11%	16.74%	15.61%

Table 3 reports the results of the Probit model of how likely a firm receives a comment on foreign cash holdings from the SEC. Marginal effects reported above correspond to the change in probability of receiving a comment on foreign cash holdings from the SEC given one standard deviation change in the independent variables. Z-statistics in the brackets are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively.

Table 4
Determinants of Firms' Disclosure Decision

Variable	All Years	Exclude Year 2010	All Years	Exclude Year 2010
	Disclosure1 (1)	Disclosure1 (2)	Disclosure2 (3)	Disclosure2 (4)
commentbefore	0.225*** [5.367]	0.256*** [5.265]	0.213*** [4.839]	0.235*** [4.742]
peercomment	0.084*** [3.195]	0.051 [1.404]	0.099*** [3.787]	0.060* [1.681]
weakness	0.03 [0.581]	0.056 [0.844]	0.048 [0.975]	0.083 [1.337]
restatement	-0.092** [-2.365]	-0.144*** [-2.948]	-0.089** [-2.421]	-0.125*** [-2.675]
highvol	-0.003 [-0.181]	-0.012 [-0.520]	-0.02 [-1.076]	-0.031 [-1.339]
size	0.060*** [2.790]	0.062** [2.296]	0.067*** [3.128]	0.066** [2.449]
age	-0.008 [-0.695]	-0.008 [-0.530]	-0.006 [-0.525]	-0.005 [-0.358]
roa	0.008 [0.613]	0.01 [0.598]	-0.001 [-0.106]	-0.002 [-0.128]
bus_segments	0.023** [2.012]	0.034** [2.391]	0.026** [2.305]	0.040*** [2.892]
geo_segments	0.020 [1.518]	0.019 [1.132]	0.027** [2.257]	0.029* [1.799]
tobinq	-0.027** [-2.114]	-0.029* [-1.870]	-0.031** [-2.522]	-0.032** [-2.113]
salesgrowth	-0.007 [-0.681]	0.004 [0.378]	-0.004 [-0.450]	0.007 [0.658]
ma	0.050*** [2.613]	0.056** [2.326]	0.060*** [3.132]	0.059** [2.561]
restructuring	-0.021 [-1.017]	-0.03 [-1.191]	-0.014 [-0.731]	-0.018 [-0.734]
extfinancing	-0.016* [-1.872]	-0.023** [-2.038]	-0.014 [-1.617]	-0.020* [-1.819]
litigation	-0.041 [-1.151]	-0.043 [-0.971]	-0.041 [-1.179]	-0.048 [-1.116]
big4	0.109** [2.441]	0.123** [2.285]	0.115*** [2.592]	0.128** [2.462]
institution	0.009 [0.813]	0.016 [1.153]	0.004 [0.379]	0.01 [0.729]
analysts	-0.026	-0.026	-0.023	-0.019

	[-1.505]	[-1.179]	[-1.292]	[-0.904]
duality	-0.046**	-0.048*	-0.045**	-0.052**
	[-2.135]	[-1.822]	[-2.137]	[-2.016]
totalcash	0.056***	0.066***	0.057***	0.071***
	[3.924]	[3.536]	[4.017]	[3.834]
pre	0.056***	0.068***	0.069***	0.083***
	[4.348]	[4.148]	[5.225]	[4.775]
taxdisclosure	0.013	0.026	0.011	0.026
	[0.424]	[0.686]	[0.349]	[0.683]
nonbinding	-0.011	-0.026	0.01	-0.002
	[-0.508]	[-0.917]	[0.442]	[-0.071]
freecashflow	-0.011	-0.025*	-0.011	-0.023
	[-1.002]	[-1.691]	[-1.000]	[-1.554]
rnd	0.001	-0.005	-0.007	-0.015
	[0.091]	[-0.363]	[-0.563]	[-1.025]
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	2975	2139	2975	2139
Pseudo R-square	23.08%	12.15%	24.31%	13.92%

Table 4 reports the results of the Probit model of how likely a firm chooses to disclose its foreign cash holdings. Marginal effects reported above correspond to the change in probability of disclosing foreign cash holdings given one standard deviation change in the independent variables. Z-statistics in the brackets are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively.

Table 5
The Valuation of Domestic and Foreign Cash Holdings

Variable	(1)	(2)	(3)	(4)
Δdcash	1.211**		0.869*	1.620***
	[2.574]		[1.874]	[3.406]
Δfcash	1.236***		2.054***	1.808***
	[3.004]		[3.473]	[3.374]
Δcash		1.671***		
		[3.731]		
Δdomearnings	0.087	0.069	0.061	0.083
	[0.359]	[0.303]	[0.247]	[0.361]
Δforearnings	1.756**	1.743**	1.673**	1.738**
	[2.152]	[2.296]	[2.202]	[2.312]
Δnetassets	0.333	0.398*	0.360*	0.391*
	[1.641]	[1.812]	[1.694]	[1.777]
Δrd	1.509	1.769	1.536	1.718
	[0.738]	[0.868]	[0.763]	[0.844]
Δinterest	1.459	1.750	1.680	1.718
	[1.058]	[1.204]	[1.172]	[1.200]
Δdividends	1.178***	1.221***	1.173***	1.216***
	[3.462]	[4.455]	[3.823]	[4.376]
cash _{t-1}	0.394**			
	[2.365]			
dcash _{t-1}		0.664***	0.635***	0.644***
		[2.742]	[2.610]	[2.867]
fcash _{t-1}		0.129	0.158	0.138
		[0.872]	[0.923]	[0.900]
lev	-0.144	-0.141	-0.156	-0.144
	[-1.103]	[-1.100]	[-1.218]	[-1.123]
netfinancing	-0.506*	-0.580**	-0.537*	-0.564**
	[-1.879]	[-2.061]	[-1.942]	[-1.970]
Δcash×cash _{t-1}	-0.156			
	[-0.169]			
Δcash×dcash_{t-1}		1.257		1.283
		[1.276]		[1.265]
Δcash×fcash_{t-1}		-5.300***		-5.513**
		[-2.612]		[-2.496]
Δdcash×dcash_{t-1}			1.283	
			[1.619]	
Δfcash×fcash_{t-1}			-4.801***	
			[-3.400]	
Δcash×lev	1.304	1.889*		1.876*

	[1.276]	[1.674]		[1.667]
$\Delta\text{dcash}\times\text{lev}$			1.853	
			[1.369]	
$\Delta\text{fcash}\times\text{lev}$			1.375	
			[1.336]	
\log_assets	0.028***	0.030***	0.031***	0.030***
	[2.875]	[3.103]	[3.124]	[3.098]
Mills	0.093	0.082	0.085	0.082
	[1.583]	[1.411]	[1.393]	[1.414]
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	544	544	544	544
Adj. R-Squared	25.63%	28.75%	27.69%	28.67%
F tests				
$\Delta\text{dcash}=\Delta\text{fcash}$	p-val=0.952		p-val=0.084	p-val=0.675
$\Delta\text{cash}\times\text{dcash}_{t-1}=\Delta\text{cash}\times\text{fcash}_{t-1}$	p-val=0.007			
$\Delta\text{dcash}\times\text{dcash}_{t-1}=\Delta\text{fcash}\times\text{fcash}_{t-1}$			p-val=0.000	p-val=0.012

Table 5 reports the results of the valuation of domestic and foreign cash holdings. t-statistics reported under the coefficients are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively. Variables of interests are in boldface type.

Table 6
Repatriation Tax and the Valuation of Foreign Cash Holdings

Variable	(1)	(2)
Δ cash	0.454 [0.789]	0.622 [1.121]
Δ fcash	0.551 [0.663]	0.211 [0.413]
nonbinding	-0.011 [-0.370]	
Δ cash \times nonbinding	1.198** [2.495]	
Δfcash\timesnonbinding	0.946 [1.121]	
taxdisclosure		0.020 [0.505]
Δ cash \times taxdisclosure		1.910** [2.102]
Δfcash\timestaxdisclosure		3.079** [2.271]
Δ domearnings	0.029 [0.114]	0.087 [0.389]
Δ forearnings	1.673** [2.091]	1.474*** [2.746]
Δ netassets	0.339* [1.652]	0.390* [1.869]
Δ rd	1.099 [0.532]	1.325 [0.724]
Δ interest	1.609 [1.206]	1.036 [0.808]
Δ dividends	1.054*** [2.761]	1.221*** [3.118]
cash _{t-1}	0.399** [2.447]	0.265** [2.531]
lev	-0.157 [-1.194]	-0.096 [-0.781]
netfinancing	-0.490* [-1.772]	-0.587** [-2.122]
Δ cash \times cash _{t-1}	-0.415 [-0.465]	-0.011 [-0.015]
Δ cash \times lev	1.375 [1.341]	2.109** [2.202]
log_assets	0.030***	0.021**

	[3.081]	[2.274]
Mills	0.095	0.088
	[1.623]	[1.590]
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	544	544
Adj. R-Squared	26.21%	31.26%

Table 6 reports the results of the relationship between the repatriation tax and the valuation of foreign cash holdings. t-statistics reported under the coefficients are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively. Variables of interests are in boldface type.

Table 7
Foreign Operations and the Valuation of Foreign Cash Holdings

Variable	(1)	(2)	(3)	(4)
Δ dcash	1.001** [2.118]	1.256** [2.547]	1.442** [2.231]	1.126** [2.057]
Δ fcash	1.324*** [3.020]	1.965*** [3.196]	2.266*** [2.628]	1.126*** [2.591]
noex21	-0.163** [-2.397]			
Δ dcash \times noex21	-2.851 [-1.232]			
Δfcash\timesnoex21	-2.876* [-1.936]			
hide		-0.051* [-1.698]		
Δ dcash \times hide		-0.420 [-0.789]		
Δfcash\timeshide		-2.013* [-1.943]		
forcountries			0.001 [0.929]	
Δ dcash \times forcountries			-0.034 [-1.472]	
Δfcash\timesforcountries			-0.052* [-1.781]	
central				-0.068 [-1.277]
Δ dcash \times central				-0.301 [-0.255]
Δfcash\timescentral				1.817** [2.210]
Δ domearnings	0.120 [0.476]	0.010 [0.040]	0.114 [0.451]	0.021 [0.083]
Δ forearnings	1.544** [2.220]	1.765** [2.529]	1.580*** [2.744]	1.789** [2.131]
Δ netassets	0.320 [1.599]	0.337* [1.650]	0.351* [1.679]	0.321 [1.583]
Δ rd	1.325 [0.687]	1.264 [0.685]	1.166 [0.551]	1.412 [0.690]
Δ interest	1.277 [0.974]	1.437 [1.032]	1.272 [0.974]	1.719 [1.196]
Δ dividends	1.181***	1.254***	1.248***	1.225***

	[3.465]	[3.645]	[3.834]	[3.428]
cash_{t-1}	0.489***	0.398***	0.526***	0.406**
	[2.977]	[2.666]	[3.022]	[2.457]
lev	-0.195	-0.188	-0.175	-0.186
	[-1.549]	[-1.465]	[-1.393]	[-1.418]
netfinancing	-0.462*	-0.504*	-0.492*	-0.479*
	[-1.721]	[-1.872]	[-1.752]	[-1.775]
Δcash×cash_{t-1}	0.681	0.035	0.701	-0.050
	[0.715]	[0.046]	[0.759]	[-0.051]
Δcash×lev	0.851	1.390	1.567	1.912
	[0.951]	[1.435]	[1.501]	[1.118]
log_assets	0.027***	0.031***	0.024**	0.032***
	[2.664]	[3.038]	[2.133]	[2.977]
Mills	0.129**	0.112**	0.143**	0.086
	[2.208]	[1.987]	[2.339]	[1.438]
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	544	544	523	523
Adj. R-Squared	27.83%	28.29%	30.43%	26.28%

Table 7 reports the results of the relationship between the agency problem of foreign operations and the valuation of foreign cash holdings. t-statistics reported under the coefficients are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively. Variables of interests are in boldface type.

Table 8
Growth Opportunities and Valuation of Foreign Cash Holdings

Variable	(1)	(2)
Δcash	0.867* [1.710]	1.335** [2.501]
Δfcash	0.802** [2.038]	1.252*** [2.876]
forgrowth	0.071** [2.062]	
$\Delta\text{cash}\times\text{forgrowth}$	3.145** [2.010]	
$\Delta\text{fcash}\times\text{forgrowth}$	5.164*** [2.699]	
domgrowth		-0.189 [-1.527]
$\Delta\text{cash}\times\text{domgrowth}$		-0.091 [-0.066]
$\Delta\text{fcash}\times\text{domgrowth}$		1.224 [1.462]
$\Delta\text{domearnings}$	0.030 [0.132]	0.005 [0.023]
$\Delta\text{forearnings}$	0.952*** [2.613]	0.826** [2.201]
$\Delta\text{netassets}$	0.311 [1.525]	0.318 [1.569]
Δrd	0.657 [0.350]	0.539 [0.274]
$\Delta\text{interest}$	0.515 [0.333]	0.668 [0.455]
$\Delta\text{dividends}$	1.376*** [3.167]	1.323*** [3.313]
cash_{t-1}	0.368** [2.367]	0.355** [2.169]
lev	-0.158 [-1.160]	-0.210 [-1.546]
netfinancing	-0.577** [-2.110]	-0.555** [-2.081]
$\Delta\text{cash}\times\text{cash}_{t-1}$	0.650 [1.044]	0.091 [0.131]
$\Delta\text{cash}\times\text{lev}$	0.877 [0.976]	0.508 [0.498]
\log_assets	0.026**	0.025**

	[2.437]	[2.287]
Mills	0.129*	0.141**
	[1.898]	[2.083]
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	448	448
Adj. R-Squared	20.16%	17.96%

Table 8 reports the results of the relationship between growth opportunities and the valuation of foreign cash holdings. t-statistics reported under the coefficients are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively. Variables of interests are in boldface type.

Table 9
Valuation of Estimated Foreign Cash Holdings

Panel A: The valuation model used in Thakor and CDKS

Variable	Thakor	CDKS
Δcash	1.002*** (3.924)	1.001*** (4.507)
$\Delta\text{domearnings}$	0.358*** (3.085)	0.357*** (3.095)
$\Delta\text{forearnings}$	1.006*** (5.115)	0.829*** (4.155)
$\Delta\text{netassets}$	0.188*** (2.992)	0.220*** (3.278)
Δrd	-0.439 (-0.501)	-0.343 (-0.380)
$\Delta\text{interest}$	-0.142 (-0.108)	0.171 (0.134)
$\Delta\text{dividends}$	0.768*** (3.686)	0.748*** (3.470)
$\text{dcash_estimate}_{t-1}$	0.203*** (3.014)	0.210** (2.426)
$\text{fcash_estimate}_{t-1}$	-0.962** (-2.102)	0.165* (1.692)
lev	-0.279*** (-4.797)	-0.304*** (-5.278)
netfinancing	-0.326*** (-2.636)	-0.350*** (-2.745)
$\Delta\text{cash}\times\text{dcash_estimate}_{t-1}$	-0.238 (-0.526)	1.029* (1.856)
$\Delta\text{cash}\times\text{fcash_estimate}_{t-1}$	2.367 (0.940)	-1.098** (-2.063)
$\Delta\text{cash}\times\text{lev}$	0.402 (0.672)	0.511 (0.919)
\log_assets	0.013*** (2.617)	0.014*** (2.625)
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,461	1,461
Adj. R-Squared	19.23%	19.20%
F tests		
$\Delta\text{cash}\times\text{dcash}_{t-1}=\Delta\text{cash}\times\text{fcash}_{t-1}$	p-val=0.308	p-val=0.007

Panel B: My alternative specification of the valuation model

Variable	Thakor	CDKS
Δdcash_estimate	0.764*** (3.557)	1.078*** (4.133)
Δfcash_estimate	1.739*** (3.967)	1.052*** (3.304)
Δ domearnings	0.370*** (3.127)	0.340*** (3.020)
Δ forearnings	1.169*** (5.542)	0.824*** (4.117)
Δ netassets	0.199*** (3.071)	0.215*** (3.156)
Δ rd	-0.387 (-0.414)	-0.372 (-0.409)
Δ interest	-0.215 (-0.162)	-0.017 (-0.012)
Δ dividends	0.769*** (3.621)	0.769*** (3.581)
cash _{t-1}	0.174** (2.500)	0.182*** (2.617)
lev	-0.297*** (-5.133)	-0.297*** (-5.186)
netfinancing	-0.314** (-2.471)	-0.357*** (-2.767)
Δ cash \times cash _{t-1}	0.085 (0.182)	-0.194 (-0.415)
Δ cash \times lev	0.673 (1.255)	0.279 (0.443)
log_assets	0.015*** (2.802)	0.014*** (2.728)
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	1,461	1,461
Adj. R-Squared	18.63%	18.66%
F tests		
Δ dcash= Δ fcash	p-val=0.015	p-val=0.908

Table 9 reports the results of the valuation of estimated domestic and foreign cash holdings. t-statistics reported under the coefficients are based on standard errors clustered at firm level. *, **, and *** denote significance at 10%, 5% and 1% level, respectively. Variables of interests are in boldface type.

Table 10

Market Reactions to Treasury's Crackdown on Tax Inversions

Panel A: U.S. Acquirers in Pending or Rumored Inversion Deals

Company Names	Foreign Cash/Total Cash
Medtronic	98%
Mylan	61%
Hospira	44%
Applied Materials	41%
AbbVie	Not disclosed
Auxilium Pharmaceuticals	Not disclosed
Salix Pharmaceuticals	Not disclosed
Burger King Worldwide	Not disclosed
Chiquita Brands	Not disclosed

Panel B: Market-adjusted Returns on September 22, 2014

	Total	Disclosure		Non-Disclosure
Involved in inversion deals	-0.0061 9	-0.0105 4		-0.0026 5
Not involved in inversion deals	-0.0050 910	High Foreign -0.0017 279	Low Foreign -0.0050 280	-0.0077 351