Cross-listings and corporate cash savings: International evidence

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Abstract

This paper examines foreign firms that are cross-listed on the U.S. stock exchanges and finds that they exhibit higher cash savings sensitivity to stock price than their non-cross-listed counterparts. This finding is robust even after controlling for alternative regression specifications and samples, country-level institutional infrastructures, different listing types, and the endogeneity of the cross-listing decision. Further cross-sectional tests reveal that the increase in cash savings sensitivity to stock price is more pronounced for cross-listed firms with stock prices that are more informative, which is consistent with the influence of the managerial learning channel. The empirical evidence sheds more light on the implications of the cross-listing decision for international firms' corporate cash management policies.

JEL classification: G15; G31; G34

Keywords: Cross-listings; Cash savings; International study

1. Introduction

Cross-listing and cash management are two important corporate decisions that managers of international firms must consider. The decision by an international firm to cross-list in the U.S. market could be rewarding due to the increased international visibility and recognition it provides, which would enhance the firm's reputation and future growth prospects. Despite the numerous studies conducted in this area, no empirical study has examined the consequences of the cross-listing decision for international firms' cash savings decisions.

However, recent empirical studies provide evidence to suggest that the financial markets ***are not just a sideshow***, but are relevant to firms' corporate policies (Morck et al., 1990). In particular, stock prices contain information about future growth opportunities that is valuable for managers when they are making investment and cash savings decisions. For example, Chen et al. (2007) find that U.S. firms with stock prices that contain more private information make investments that are more sensitive to stock prices. In addition, Fresard (2012) demonstrates that when stock prices are more informative, firms' cash savings exhibit higher sensitivities to stock prices.

One important research question that arises from these two separate strands of literature is whether cross-listings can influence firms' cash savings decisions. The main objective of this study is to examine the effect of cross-listing on the sensitivity of firms' cash savings to stock price. The findings from recent studies suggest that cross-listings should result in an increase in cash savings sensitivity to stock price, as managers of the cross-listed firms are able to obtain more accurate information about the value of future investment opportunities.

Using an international sample that covers 41 countries from 1983 to 2007, this study documents that cross-listed firms demonstrate higher cash savings sensitivity to stock price than

non-cross-listed firms by about 400%. The effect only exists after the firms are cross-listed and continue to be present three years after the cross-listing year. In addition, the magnitude and statistical significance of the results are not affected by changes in regression specifications, the use of different standard error clusters and alternative samples, or by controlling for endogeneity and self-selection bias using the instrumental variable (IV) estimation and Heckman's (1979) correction model. Further investigation suggests that the positive relationship between cross-listing and cash savings sensitivity to stock price only exists for foreign firms that are cross-listed on the U.S. stock exchanges (NYSE/AMEX/NASDAQ) and not for other types of cross-listings such as over-the-counter (OTC) or private placement (Rule 144A) listings. Moreover, the effect appears to be weaker after the implementation of SOX.

The second objective of this paper is to compare explanations for the positive relationship between cross-listing and cash savings sensitivity to stock price. The agency channel offers one plausible explanation. Prior cross-listing studies document that market segmentation and legal bonding are the two most relevant explanations of the cross-listing decision. One important finding is that managers of cross-listed firms have fewer tendencies to expropriate shareholders due to the stronger disclosure requirement of the cross-listing. As a result, strong legal protection through cross-listing helps to mitigate agency problems and decrease the problems of overinvestment and underinvestment. If this explanation is valid, an improvement in cash savings sensitivity to stock price should be more prominent for the sample of firms located in countries with weak investor protection, as these firms benefit the most from cross-listing.

Access to external financing channels provides another explanation. Cross-listing is typically one important way through which foreign firms can alleviate the financing constraints they face in the home markets, and facilitates access to external financial markets to help these firms

finance their investment opportunities (Lins et al., 2005). If this explanation is valid, financially constrained firms can be expected to demonstrate a higher increase in cash savings sensitivity to stock price due to the cross-listing.

The role of managerial learning in the corporate decisions made by managers in a cross-listing environment provides the final explanation. Cross-listings have been documented to improve the informativeness of a firm's stock price (Fernandes and Ferreira, 2008), allowing managers to obtain more precise information about the value of future growth opportunities. Therefore, for the managerial learning explanation to be valid, the positive relation between cross-listing and cash savings sensitivity to stock price ought to be more pronounced for cross-listed firms with more informative stock prices.

To examine the validity of these three competing hypotheses, the sample is partitioned into subsamples based on firm-level measures of financial constraint (using changes in size and dividend payout ratio), firm-level measures of stock price informativeness (using analyst coverage and firm-specific return variation) and country-level institutional variables that proxy for access to external finance and investor protection. The results of cross-sectional tests reveal that the positive effect of cross-listing on the cash savings sensitivity to stock price is more prominent for cross-listed firms that are financially unconstrained and for firms in countries with strong investor protection. These empirical findings are contrary to expectations and rule out the possibility that they are driven by the agency channel or access to external financing channels.

However, a striking difference is observed in the effect of cross-listing on the cash savings sensitivity to stock price for the two subsamples of cross-listed firms partitioned via firm-specific return variation and analyst coverage. In particular, the increase in cash savings sensitivity to stock price is driven by the sample of cross-listed firms with high firm-specific return variations

and low analyst coverage, which reinforces the role of managerial learning in explaining the positive relation between cross-listing and cash savings sensitivity to stock price.

This paper contributes to the ongoing debate over cross-listing and cash management policies in the international setting. The main results extend the literature related to the real effects of stock prices on firms' corporate policies (see the recent survey by Bond et al., 2012). More importantly, cross-listing leads to an increase in the relationship between cash savings and stock price. This is achieved via the managerial learning mechanism, and corroborates the findings of several recent studies (Chen et al., 2007; Foucault and Fresard, 2012; Fresard, 2012).

With the liberalization of international financial markets and the increasing disclosure requirement in the U.S. markets, the empirical findings of this study should partially address Karolyi's (2006) concern on the "real economic consequences" of cross-listings and have important implications for the investment flows and capital allocations of cross-listed firms that in turn should affect the cash management policies of those firms.

The remainder of this paper is organized as follows. Section 2 reviews the literature related to cross-listing and the relationship between cash savings and stock price, and develops two main hypotheses that link cross-listing decisions to the cash savings sensitivity to stock price out of the various competing explanations. Section 3 describes the cross-listing sample, main variables and research design used in the subsequent empirical tests. Section 4 presents and discusses the empirical results. Section 5 concludes the paper.

2. Hypothesis development

Many studies have explored competing explanations for what compels foreign firms to cross-list their stocks on the U.S. exchanges. The conventional view of the cross-listing decision arises from market segmentation, which limits the international flows of investment capital (Miller, 1998). Foreign firms seek to overcome investment barriers by listing their stocks on the U.S. exchanges. The benefits these firms enjoy from cross-listing their stocks include improved access to external capital markets, a lower cost of capital, an expanded shareholder base, increased liquidity in trading and positive reputational effects.

The bonding hypothesis was first introduced by Coffee (1999, 2002). He rationalizes that foreign firms decide to cross-list on the U.S. exchanges to commit managers to a stronger legal and regulatory regime. In a similar spirit, Stultz (1999) raises the issues of agency conflicts and information asymmetry and emphasizes the importance of corporate governance as one potential determinant of the cross-listings decision. A stronger corporate governance system limits managers' consumption of the private benefits of control, which could be harmful to minority shareholders. As a result, cross-listings improve the information environment of foreign firms (Lang et al., 2003) and firm valuations (Doidge et al., 2004).

Recent studies show that the stock market matters for investment and cash savings decisions. In particular, the theoretical models developed by Dow and Gorton (1997) and Subrahmanyam and Titman (1999) suggest that stock prices may offer some private information that managers are unaware of, as they reflect a collection of information from market participants such as traders and investors. Chen et al. (2007) find that managers rely on the private information in stock prices and incorporate it into their investment decisions, as stock price non-synchronicity

(1-R^2) and the probability of informed trading (*PIN*) have positive effects on the sensitivity of investment to stock price.

A recent theoretical paper by Foucault and Gehrig (2008) positions managerial learning as an alternative explanation of the cross-listing decision and derives important testable implications for the connection between cross-listings and the sensitivity of investment to stock price. Consistent with the finding of Fernandes and Ferreira (2008), they argue that stock prices are more informative for foreign firms that cross-list on the U.S. exchanges. This enables managers of cross-listed firms to obtain more accurate information about the value of their firms' future growth prospects, which in turn influences their investment decisions. Therefore, one prediction of their model is that the sensitivity of investment to stock price should be larger for foreign firms that cross-list on the U.S. markets, as doing so enhances the stock price informativeness of a firm and thereby enables managers to acquire more precise information about the value of future growth opportunities.

Foucault and Fresard (2012) find empirical support for Foucault and Gehrig's (2008) theoretical prediction. In addition, Fresard (2012) documents that beyond investment decisions, cash savings decisions are positively associated with stock price. Moreover, the cash savings sensitivity to stock price is augmented for firms with more informative stock prices. The findings of Chen et al. (2007), Foucault and Fresard (2012) and Fresard (2012) demonstrate that financial markets *are not just a sideshow* but affect firms' investment and cash savings decisions. More importantly, these studies highlight the role of managerial learning in firms' real activities.

The agency channel (McLean et al., 2012) and access to external financing channels (Baker et al., 2003) provide two other explanations. Cross-listing helps to mitigate the agency conflicts between corporate managers and minority shareholders by forcing managers to direct their

efforts toward investing in growing sectors and preventing them from overinvesting in declining sectors or engaging in dysfunctional behavior. Furthermore, cross-listed firms face fewer constraints in raising external funds to finance their investment projects.

These three explanations suggest that the stock prices of cross-listed firms should reflect additional innovations in investment opportunities. This leads to the conjecture that cross-listed firms should exhibit higher cash savings sensitivity to stock price than non-cross-listed firms.

H1. *The cash savings of cross-listed firms are more sensitive to stock prices than those of non-cross-listed firms*.

As mentioned earlier, Fresard (2012) argues that the influence of stock price on cash savings decisions can be attributed to managerial learning. In other words, the increase in cash savings is more prominent if the stock prices reflect private information that is new to the managers. Fernandes and Ferreira (2008) show that cross-listing is positively related to the private information (measured using firm-specific return variation) contained in stock prices. Therefore, if the managerial learning channel is valid, the increase in cash savings sensitivity to stock price should be more pronounced for cross-listed firms with more informative stock prices. The stock prices subsequently convey more accurate signals about future growth opportunities, and managers can exploit this signal more effectively than firms with less-informative stock prices. This leads to the first part of the following second hypothesis.

H2a. *If the managerial learning channel is valid, the positive relationship between cross-listing and cash savings sensitivity to stock price should be more pronounced for firms with more informative stock prices.*

As cross-listed firms are required to bind themselves to stricter disclosure requirements, their managers have less of an incentive to expropriate minority shareholders and help curb the problems associated with overinvestment and/or underinvestment. Moreover, the external capital markets are more accessible for cross-listed firms that wish to finance their investment projects. Based on these arguments, the positive relationship between cross-listing and cash savings sensitivity to stock price is expected to be more pronounced for financially constrained firms, firms located in countries where access to financing is more difficult and firms in countries with weak legal protection where more severe agency problems exist between managers and shareholders. Moreover, Lins et al. (2005) suggest that managers of firms in countries with low access to external financing can exploit an increase in growth opportunities due to the cross-listing more effectively than managers of firms in countries with high access. This leads to the second part of the second hypothesis.

H2b. *If the agency or access to an external financing channel is valid, the positive relationship between cross-listing and cash savings sensitivity to stock price should be more pronounced for financially constrained firms and firms located in countries with weak investor protection and low access to external financing.*

3. Sample data and variable construction

3.1. Construction of cross-listing sample and country-level variables

Following previous studies, the sample of international firms that are cross-listed in the U.S. and other overseas stock exchanges (such as the London Stock Exchange) is obtained from the primary depositary institutions, including Citibank, Bank of New York Mellon, J.P. Morgan, the

NYSE and the NASDAQ.[1] The data consists of firms with ordinary listings on the U.S. stock exchanges or those listed as American Depositary Receipts (ADRs) with different types of listings: Level-1 ADRs listed on the OTC market, Level-2 and Level-3 ADRs listed on the NYSE/NASDAQ, and firms listed for private placements under Rule 144a. The data also includes the effective listing date for each cross-listed firm.[2] The list is further supplemented by firms with direct listings on the two U.S. stock exchanges (NYSE/NASDAQ) according to their respective websites, as information about these listings might not have been available from the depositary institutions, particularly for cross-listed firms from Canada and Israel.

Because firms could have had multiple listings, upgraded and downgraded their listing status or even been delisted due to mergers and acquisitions, their listing statuses as provided by Citibank are manually checked and verified with information from other sources such as Factiva and Lexis-Nexis. This procedure ensures that each cross-listed firm had only one type of cross-listing in each year and that its effective cross-listing date reflects its latest listing status.

Next, firm-level financial and return data are retrieved from Worldscope and Datastream (both provided by Thomson Reuters) and analyst coverage data is obtained from I/B/E/S. To be included in the sample, firms are required to have non-missing firm-year observations for their total assets, total sales, stock prices, market and book values of equity, and cash holdings. Following previous studies, firms operating in the financial (SIC codes between 6000 and 6999) and regulated (SIC codes between 9000 and 9999) industries, firms with negative total sales and book values of common equity and firms with book values of total assets less than US$10

[1] These websites are www.adrbnymellon.com/home_dr.jsp (Bank of New York Mellon), wwss.citissb.com/adr/home/home.asp (Citibank); www.adr.com (J.P. Morgan); www.nyse.com (NYSE) and www.nasdaq.com (NASDAQ).

[2] The Securities Exchange Commission (SEC) imposes different requirements for the different types of cross-listed firms. Level-2 and Level-3 ADR firms are subject to more stringent rules and regulations, and Level-3 firms are allowed to raise capital on the U.S. exchanges. In general, the shares of these firms are traded more actively than those of Level-1 firms.

million are excluded from the sample. The industry classification follows that of Fama and French (1997). The cross-listing sample is then matched with the firm-specific financial variables and the final sample consists of an unbalanced panel of 119,726 firm-year observations for 17,120 firms in 41 countries. The sample period covers 1983-2007. Japan and the U.K. have the largest number of firms and firm-year observations, each with more than 1,700 firms and 14,000 firm years. Colombia, Egypt and Sri Lanka have the smallest numbers, with fewer than 25 firms and 150 firm-year observations.

The sample firms are classified into cross-listed firms and benchmark firms (i.e., those that never cross-list on overseas exchanges). Panel A of Table 1 presents the distribution of firms (and firm-year observations) for each country in the sample. The sample comprises 1,176 cross-listed firms (12,214 firm-year observations) and 15,944 benchmark firms (107,512 firm-year observations). Four dummy variables are created to denote the different listing types. Firms that are cross-listed on the U.S. exchanges are denoted as *ADR* firms. Likewise, firms that are traded on the OTC market (listed via private placements) are denoted as *OTC* (*R144A*) firms. The last category of firms, *OTHERS*, denotes firms that are cross-listed on other overseas stock exchanges. In the empirical analysis, the primary focus is on the sample of 486 *ADR* firms, although robustness tests are also conducted on the other cross-listed samples, including 465 *OTC* firms, 203 *R144A* firms and 22 *OTHERS* firms.

Panel A shows a substantial variation in the number of cross-listed firms in the international sample. Six countries (Colombia, Egypt, Malaysia, Pakistan, Sri Lanka and Thailand) have no firms cross-listed on the U.S. exchanges, and three countries (Canada, Israel and the U.K.) have more than 50 *ADR* firms. India and Taiwan have the largest numbers of *R144A* firms (71 and 38 firms, respectively) and are the two countries apart from Thailand with the highest numbers of

OTHERS firms.[3] Finally, Australia, Hong Kong, Japan and the U.K. have the largest numbers of *OTC* firms, with more than 45 firms in each country.

Panel B of Table 1 presents the descriptive statistics for the country-level institutional variables that previous studies consider important for international studies. The variables include the access to equity market (*ACCESS*) and anti-self-dealing (*ANTISELF*) indices used by La Porta et al. (2006) and Djankov et al. (2008), and the legal origin (*LO*) dummy variable used by La Porta et al. (1997), which equals 1 for common-law countries and 0 for civil-law countries.[4] These country-level indices measure the extent of firms' access to the capital market and legal protection in each country. Higher *ANTISELF* (*ACCESS*) index variables are indicative of stronger levels of investor protection and law enforcement effectiveness (i.e., a more accessible capital market). *ACCESS* is only available for 39 out of the 41 countries in the sample, and ranges from 2.78 (Colombia) to 6.43 (Netherlands) with a mean (median) value of 5.18 (5.29) and a standard deviation of 0.87.[5] *ANTISELF* ranges from 0.17 (Mexico) to 1 (Singapore) with a mean (median) value of 0.52 (0.46) and a standard deviation of 0.24. Finally, 13 (28) out of the 41 countries in the sample adopt the common (civil)-law legal tradition.

[Insert Table 1 here]

[3] The two notable exchanges apart from the U.S. exchanges are the London Stock Exchange and Luxembourg Stock Exchange.

[4] Detailed descriptions of each index can be found in the respective papers.

[5] Untabulated tests show that all of the correlations between the country-level indices are statistically significant at least at the 10% level, which confirms the findings of previous studies related to the high correlations among these institutional variables.

3.2. Research design and methodology

The research design closely follows that of Almeida et al. (2004), Khurana et al. (2006) and Fresard (2012). To test H1, the baseline cash savings regression (equation (1)) is estimated using the ordinary least squares (OLS) model as follows:

$$CCASH_{i,t} = a_o + bQ_{i,t-1} + b_1(Q_{i,t-1} \times ADR_{i,t-1}) + cADR_{i,t-1} + dCF_{i,t-1} + eSIZE_{i,t,} + \sum b_c Country_c + \sum b_j Industry_i^j + \sum b_t Year_t + u_{i,t}, \quad (1)$$

where *i* and *t* represent firm *i* and time *t*, respectively. $CASH_{i,t}$ represents the cash holdings for firm *i*, calculated as the ratio of cash and cash equivalents to total assets (both at the end of year *t*). The dependent variable in equation (1) is $CCASH_{i,t}$, which represents cash savings and is calculated as the ratio of the annual change in cash and cash equivalents for firm *i* from year *t*-1 to *t* to total assets in year *t*.[6]

As for the control variables, $ADR_{i,t}$ is a dummy variable that equals 1 if firm *i* is cross-listed on a U.S. exchange in year *t* and 0 otherwise. The lagged one-period value of *ADR* is used in equation (1). $CF_{i,t-1}$ is the cash flow for firm *i*, calculated as the ratio of earnings before extraordinary items plus depreciation and amortization in year *t* to total assets in year *t*-1. Similar to prior studies (Baker et al., 2003; Chen et al., 2007), $Q_{i,t-1}$ (the market-to-book-ratio for firm *i* at time *t*-1) is used as the main stock price measurement.[7] The market-to-book ratio is calculated as the ratio of market value of equity (i.e., stock price multiplied by the number of shares

[6] Almeida et al. (2004) and Khurana et al. (2006) use total assets in year *t* as the denominator, and Fresard (2012) uses total assets in year *t*-1. According to unreported results (available upon request), all of the results are unchanged if the total assets in year *t*-1 is used as the denominator.

[7] Biddle and Hillary (2006) argue that using the natural logarithm of the market-to-book ratio mitigates concerns related to the presence of outliers in a cross-country sample. McLean et al. (2012) use the same variable. In an unreported regression, *Q* is replaced by log(*Q*) and similar results are obtained.

outstanding) plus total assets minus book value of equity to total assets. $SIZE_{i,t}$ represents the firm size, calculated as the natural logarithm of total assets (in millions of U.S. dollars) in year *t*. In addition, the country (b_c), industries (b_j) and year (b_t) dummies are included in equation (1) to control for the respective fixed effects. $u_{i,t}$ is an error term that is assumed to be independent of the explanatory variables. White's heteroskedasticity-corrected robust standard errors, which are clustered by firm, are also estimated to mitigate the problems of serial auto-correlation and heteroskedasticity.

The coefficients of *Q* and *CF* measure the cash savings sensitivities to stock price and cash flows, respectively. Recent studies have examined the determinants of these two coefficients (e.g., Almeida et al., 2004; Khurana et al., 2006; Kusnadi and Wei, 2011; Fresard, 2012). The main coefficient of interest in equation (1) is the interaction term between *Q* and *ADR*, b_1, which captures the incremental effect of the cross-listing decision on cash savings sensitivity to stock price. H1 predicts that this interaction coefficient is positive. In other words, cross-listing is expected to result in an incremental increase in cash savings sensitivity to stock price.

3.3. Descriptive statistics of firm-specific variables

In addition to the variables described earlier, several other firm-specific variables are calculated based on the Worldscope data. *CAPEXR* represents capital investment, calculated as the ratio of the sum of capital expenditures to total assets (both at the end of year *t*). *ACQR* represents acquisitions, calculated as the ratio of acquisitions to total assets (both at the end of year *t*). *CNWC* is the change in net working capital (current assets minus current liabilities), calculated as the ratio of the change in net working capital from year *t*-1 to *t* to total assets at the

end of year *t*. *CSTD* is the change in short-term debt, calculated as the ratio of the change in short-term debt from year *t*-1 to *t* to total assets at the end of year *t*.

Table 2 presents the descriptive statistics of the main firm-specific financial variables for the whole sample. On average, international firms hold about 15% of their assets (median = 10%) in the form of cash holdings, with a standard deviation of 0.19. The average firm's cash savings are about 0.6% (median = 0.2%), with a standard deviation of 0.07. The interquartile range of cash saving is about 4.7% (2.9% minus -1.8%). These numbers are slightly higher compared with those found in a study by Khurana et al. (2006), where the mean cash holdings and cash savings are about 10% and 0.1%, respectively

The average values of the market-to-book ratio and cash flows are 1.36 (median = 1.13) and 12% (median = 11%), respectively. The corresponding standard deviations are 0.808 and 0.118, respectively. Moreover, the average capital investment and acquisition ratios are about 6% and 1% (median = 4% and 0, respectively). The average changes in net working capital and short-term debt are relatively small at 1% and 0 (matching the median values), respectively. Finally, the average firm size is about 20 (matching the median value), with a standard deviation of 1.72.

[Insert Table 2 here]

4. Empirical results and discussion

4.1. The effect of cross-listing on cash savings sensitivity to stock price

The first empirical task is to investigate how cross-listing influences cash savings sensitivity to stock price. The results of the equation (1) estimation are presented in Column (1) of Table 3 and the evidence in Column (1) supports H1, as the interaction coefficient is positive (0.008) and statistically significant (*t*-statistic = 4.09) at the 1% level. In terms of economic magnitude, the

incremental increase in cash savings sensitivity to stock price for a cross-listed firm compared with that for a non-cross-listed firm is about 400% (four times).[8] In addition, an increase of one standard deviation in the value of *Q* (0.808) increases the cash savings of a non-cross-listed firm by 0.2%. However, the corresponding cash savings increase of a cross-listed firm is 0.8%. This value represents about 130% of the average value of cash savings for the whole sample (0.006).[9] Therefore, the main finding reveals that cash savings are ***more responsive*** to changes in stock price for a cross-listed firm than for a non-cross-listed firm.

Equation (1) is further estimated using various alternative regression specifications. First, because there is a great variation in the number of firm-year observations for the 41 countries used in the sample, Column (2) reports the results of the weighted least squares (*WLS*) methodology, where the weight is the inverse of the number of firms in each country. Second, Column (3) reports the results using the Fama-MacBeth (1973) cross-sectional regression methodology. Third, instead of using country fixed effects and clustering at the firm level, Columns (4) and (5) report the results using the firm fixed effects model to account for unobserved firm-specific variables that do not vary across time and using clustering at the country level, respectively.[10] In general, the main finding of a positive relation between cross-listing and cash savings sensitivity to stock price persists in all of the specifications, with the magnitudes of the coefficient b_1 ranging from 0.008 to 0.015.

[8] The increase in the value of cash savings sensitivity to stock price = (0.008/0.002) × 100 = 400%.

[9] The calculation is as follows: the increase in cash savings for a non-cross-listed firm = b × std dev (Q) = 0.002 × 0.808 = 0.2%. Meanwhile, the increase in cash savings for a cross-listed firm = (b+ b_1) × std dev (Q) = (0.002 + 0.008) × 0.808 = 0.8%.

[10] Equation (1) is also estimated for the sample of *ADR* firms only, i.e., 486 firms and 4,977 firm-year observations. The results are unchanged.

In terms of the other control variables, the coefficients of *Q* and *CF* are both positive and statistically significant in most of the specifications, which is largely consistent with the findings of previous studies (e.g., Almeida et al., 2004; Khurana et al., 2006; Kusnadi and Wei, 2011; Fresard, 2012). These results imply that cash savings decisions are positively associated with cash flows and stock prices. The coefficient of *ADR* is negative and significant in all of the specifications, suggesting that the cross-listing decision leads to a decline in corporate cash savings. One possible explanation for this finding is that cross-listed firms are able to raise financing for their investment projects more easily, which lessens the need to save cash as a precaution. Meanwhile, the sign of the *SIZE* coefficient is positive and significant in three out of the five specifications.

More relevantly, this study's empirical evidence of a ***positive*** relationship between cross-listing and cash savings sensitivity to stock price logically ties up the various recent findings of the literature. The private information contained in stock prices has a positive effect on the sensitivity of corporate cash savings to stock price (Fresard, 2012). Because the stock prices of cross-listed firms are more informative (Fernandes and Ferreira, 2008), corporate cash savings of cross-listed firms should also be more responsive to changes in stock prices, which is the main finding of this study. Moreover, the allocation of cross-listed firms' investment decisions is more efficient, as demonstrated by the higher sensitivities of investment to stock price (Foucault and Fresard, 2012). Therefore, as the savings are used to finance those more efficient investment decisions, the cash holdings of cross-listed firms are valued at a higher premium (Fresard and Salva, 2010).

[Insert Table 3 here]

4.2. Robustness tests

In this sub-section, a series of sensitivity analyses are conducted to verify the robustness of the results. First, the cross-country and time-series variations in the relationship between cross-listings and cash savings sensitivity to stock price are explored by estimating the baseline equation (1) country by country and year by year, and the results are reported in Figures 1 and 2, respectively. Figures 1 and 2 demonstrate substantial variations in the cash savings sensitivity to stock price values for the average firm (coefficient *b*, represented by the dark-grey bar) and an incremental increase in cash savings sensitivity to stock price values for the cross-listed firms (coefficient b_1, represented by the light-grey bar) for different countries and in different years. The values of coefficient *b* are relatively smaller (with a maximum value of 0.007) than that of coefficient b_1. However, the values of coefficient *b* increase in recent years (since 2003). Firms in Sri Lanka (Columbia) exhibit the highest (lowest) value of coefficient *b*, and cross-listed firms in Portugal (Peru) display the highest (lowest) value of coefficient b_1. On average, cross-listing decisions result in ***higher*** cash savings sensitivity to stock price sensitivities in 21 out of the 41 countries and 19 out of the 25 years covered by the sample.

[Insert Figures 1 and 2 here]

Second, changes in cash savings sensitivity to stock price influenced by the cross-listing decision are also examined. Seven event windows are constructed and the firms are classified into event year 0 for the year during which they were cross-listed on the U.S. exchanges. Consequently, the event year +n (-n) represents n years after (before) the firms were cross-listed. In total, the event time covers a period of seven years (three years before and three years after, including year 0). The interaction term $Q \times ADR$ is then excluded from equation (1) and the

modified equation for the seven event windows is estimated separately. Figure 3 portrays the evolution of cash savings sensitivity to stock price estimated for the seven event windows, together with the error bars that represent the corresponding 95% confidence interval. The values of the interaction term $Q \times ADR$ are small (and negative in event year -2) in the event years -1 to -3 (i.e., before the cross-listing). However, there is a sudden spike in the value of the interaction term, which increases substantially from 0.003 in year -1 to 0.026 in year 0. Although the values after the cross-listing (year +1 to +3) are smaller than that of year 0, they are still noticeably higher than those obtained before the cross-listing. Thus, Figure 3 offers evidence that is consistent with H1 in that the cash savings sensitivity to stock price ***increases*** for the cross-listed firms only ***after*** the cross-listing decision (event year 0) and not before.

[Insert Figure 3 here]

Third, additional variables are included in equation (1) and any possible endogeneity and self-selection bias is controlled for. The results are reported in Table 4. In Column (1) of Table 4, another interaction coefficient ($CF \times ADR$) is included as an additional control variable in the estimation of equation (1). Cross-listing continues to have a positive effect on cash savings sensitivity to stock price despite the inclusion of the additional regressor. However, there is no evidence that cross-listing leads to a change in the cash-cash flow sensitivity, as the interaction coefficient ($CF \times ADR$) is negative but statistically insignificant.

[Insert Table 4 here]

In Column (2) of Table 4, lagged cash holdings (denoted as *LCASHR*) are included because a firm's cash savings decisions are influenced by the initial availability of its cash (Fresard,

2012). In Column (3) of Table 4, *Q* is replaced by *RATIO*, which is calculated as the ratio of future investment (year *t*+1) to current investment (year *t*) (Almeida et al, 2004; Khurana et al, 2006). Despite these changes, the interaction coefficient $Q \times ADR$ or $RATIO \times ADR$ retains its positive significance and the main finding is unchanged.

Another important issue that arises is the potential endogeneity surrounding the cross-listing decision. Prior studies acknowledge this concern, and international firms with higher cash savings sensitivities to stock price may be more likely to cross-list on the U.S. exchanges. This would create a self-selection bias in the finding of a positive relation between cross-listing and the cash savings sensitivity to stock price. Moreover, cash savings decisions are simultaneously determined along with other important corporate decisions such as investments and leverage, which could also change due to cross-listing.

Two alternative approaches are adopted to mitigate the concerns related to endogeneity and self-selection bias. First, this study follows those of Almeida et al. (2004) and Fresard (2012) by including several other variables that could also affect a firm's cash savings decisions into the cash savings regression estimation, such as *CAPEXR* (capital expenditures), *ACQR* (acquisition), *CNWC* (change in net working capital) and *CSTD* (change in short-term debt). Moreover, because financing and investment decisions are endogenously determined, an IV estimation is implemented using the one- and two-period lagged values of fixed assets, acquisitions, net working capital, short-term debt and sales growth as the relevant instruments to estimate each of the four additional variables. The predicted values of the four variables are included as additional explanatory variables in the equation (1) estimation using the OLS regression model with country, industry and year fixed effects. As shown in Column (4) of Table 4, the coefficient b_1 remains positive (magnitude = 0.006) and highly significant (*t*-statistic = 2.71) as expected.

Second, a two-stage least squares regression (2SLS) methodology is implemented. In the first stage, a probit model of the cross-listing decision is estimated as follows:

$$ADR_{i,t} = a_o + bSIZE_{i,t} + cLEV_{i,t} + d\log(Q_{i,t}) + eROA_{i,t} + fSALESG_{i,t} + gLO_c + hEFF\_JUD_c + iCIFAR_c + jLNGDP_c + +\sum b_c Country_c + \sum b_j Industry_i^j + \sum b_t Year_t + u_{i,t}, \quad (2)$$

where the dependent variable is the dummy variable *ADR*, which denotes the firms cross-listed on the U.S. exchanges. For each firm *i*, the following control variables are included. $SIZE_{i,t}$ represents the firm's size, calculated as the natural logarithm of its total assets at time *t*; $LEV_{i,t}$ represents the firm's leverage, calculated as the ratio of total debt to total assets at time *t*; $\log(Q_{i,t})$ is the natural logarithm of Tobin's *Q* at time *t*; $ROA_{i,t}$ represents the firm's return on assets, calculated as the ratio of its net income to its total assets at time *t*; and $SALESG_{i,t}$ represents the firm's sales growth, calculated as the percentage change in its sales from year *t*-1 to year *t*. $EXT\_FIN_{j,t}$ is a variable taken from a study by Rajan and Zingales (1998). It measures the firm's dependence on external finance, and is calculated as the mean ratio of the firm's capital expenditures minus its cash flow from operations to the capital expenditures of all of the firms in each industry *j* at year *t*. In addition to the firm-level control variables, several country-level variables that may affect cross-listing decisions are included, where LO_c is the legal origin dummy variable for each country *c*, EFF_JUD_c is a variable taken from a study by La Porta et al. (2006) representing the efficiency of the judiciary index, $CIFAR_c$ a variable taken from a study by La Porta et al. (1997) representing the accounting standards index and $LNGDP_c$ is a variable taken from a study by La Porta et al. (2006) representing the natural logarithm of the gross domestic product (*GDP*) per capita.

Equation (2) is estimated using the probit regression model with country, industry and year fixed effects. The results (unreported) reveal that large firms and firms with higher stock prices and profitability are more likely to cross-list on the U.S. exchanges. However, sales growth is negatively related to the decision to cross-list. The predicted values (lagged one period) from the probit model are subsequently obtained as instruments for the dummy variable *ADR* in estimating the second-stage regression, which is the cash savings regression (equation (1)). The inverse Mills ratio (*IMR*) from the probit regression is included in the modified equation (1) to correct for any self-selection bias in the second-stage regression using the Heckman (1979) correction model. The estimation results for the second-stage cash-savings regression using the Heckman model are presented in Column (5) of Table 4. The coefficient of the *IMR* is positive and statistically significant, confirming the presence of self-selection bias in the sample. Nevertheless, the interaction coefficient $Q \times ADR$ displays a positive association with cash savings (magnitude = 0.038 and *t*-statistic = 4.52). The main inference is unaffected, even after controlling for any possible endogeneity and self-selection bias.

Fourth, the likelihood that certain countries or sample periods drive the results is controlled for, and the results are presented in Table 5. In Column (1) of Table 5, Japan and the U.K., which dominate the sample, are excluded to determine whether the main results hold. In Column (2) of Table 5, the years during which the Asian financial crisis and Internet bubble occurred are excluded, as a great variation in firms' cash savings could be presented during those periods. Finally, the sample is partitioned into three periods, including 1983-1991, 1992-2001 and 2002-2007 (which also correspond to the post-SOX periods), and the results are presented in Columns (3)-(5) of Table 5. In general, the main finding is not influenced by the two large countries in the sample or by specific events. However, it is interesting to note that the results are strongest in the

middle period (1993-2001) and that the coefficient of the interaction term becomes insignificant in the post-SOX period.[11]

[Insert Table 5 here]

Fifth, several recent studies have documented that country-level institutions are relevant to firms' corporate policies. As a result, it is imperative to control for these effects in the regression specifications by including the additional interaction terms of Q with the country-level institutions and estimate equation (3) as follows:

$$CCASH_{i,t} = a_o + bQ_{i,t-1} + b_1(Q_{i,t-1} \times ADR_{i,t-1}) + cADR_{i,t-1} + d(CF_{i,t} \times Z_i) + e(Q_{i,t} \times Z_i) + eSIZE_{i,} + \sum b_c Country_c + \sum b_j Industry_i^j + \sum b_t Year_t + u_{i,t}, \quad (3)$$

where for country c, Z_c refers to a time-invariant measure of country-level institutions. All of the other variables are as defined earlier.

Equation (3) is estimated using the OLS regression model with country, industry and year fixed effects and three different measures of country-level institutions (*ACCESS*, *ANTISELF* and *LO*). As shown in Table 6, the interaction coefficient $Q \times ADR$ continues to be positive and is statistically significant in all three of the specifications. This implies that cross-listing plays ***an incremental role*** in the cash savings sensitivity to stock price, even after controlling for the effect of country-level institutions. Meanwhile, the interaction coefficient $Q \times Z$ is positive and statistically significant (at the 5% level) only for *ACCESS*. The other interaction coefficient $CF \times Z$ is negatively and statistically significant in all three of the specifications.

[Insert Table 6 here]

[11] In particular, cross-listed firms must disclose more public information during the post-SOX period due to the more stringent disclosure requirements, which increase the costs associated with cross-listing.

4.2. Controlling for different types of cross-listing

In addition to *ADR* firms, it is necessary to investigate whether different types of cross-listing have similar effects on the cash savings sensitivity to stock price. The findings of Fernandes and Ferreira (2008) suggest that other listing types (i.e., *OTC* and *R144A*) are less important than exchange listings (*ADR*) in driving firms' return variations. From these findings, the effects of other listing types (including listings on other overseas stock exchanges) on cash savings sensitivity to stock price are expected to be smaller than those observed for an exchange listing and may even be insignificant.

Equation (1) is modified by replacing the interactions of *Q* and *CF* with *ADR* with their respective interactions with the other three listing types (*OTC*, *R144A* and *OTHERS*). The modified equation is estimated using the OLS regression model with country, industry and year fixed effects. The results in Table 7 are consistent with the conjecture. None of the three listing types displays positive and significant cash savings sensitivity after cross-listing, as revealed in Columns (1)-(3) of Table 7.[12] In Column (4) of Table 7, when all four types of cross-listings on the U.S. exchanges are included, only the *ADR* firms display higher cash savings sensitivity to stock price after cross-listing.

[Insert Table 7 here]

4.3 Cross-sectional variations

There are three competing explanations for the positive relationship found between cross-listing and cash savings sensitivity to stock price: the agency channel, access to external financing channel and the managerial learning channel. In this subsection, further tests are conducted to examine the validity of each explanation.

[12] Cash savings are marginally negatively associated with stock price for firms listed under Rule 144A.

The first explanation is taken from a study by McLean et al. (2012). As mentioned earlier, if the finding is driven by the agency channel, the positive association between cash savings and stock price should be more prominent for cross-listed firms in countries with weaker legal protection, as these firms are likely to suffer from agency-related problems before cross-listing.

To test this proposition, the same two measures of country-level institutions (*ANTISELF* and *LO*) used in Table 6 are used as proxies for investor protection, and the sample is partitioned into *Low* and *High ANTISELF* subsamples for index values below and above the median value, respectively. For *LO*, the sample is partitioned into *Common-Law* and *Civil-Law* countries. Equation (1) is then re-estimated for each of these subsamples using the OLS regression model with country, industry and year fixed effects to determine whether they exhibit differing relationship between cross-listing and cash savings sensitivity to stock price.

The findings are presented in Table 8. The interaction coefficient $Q \times ADR$ is found to be positive and significant only for the subsample of firms with high self-dealing indices (Column (2)) and common-law legal traditions (Column (4)). In addition, the difference in the interaction coefficient ($Q \times ADR$) between the *Low* (*Civil Law*) and *High* (*Common Law*) *ANTISELF* subsample is negative and significant (at the 5% level) for both country-level institutional variables. This is inconsistent with the agency channel explanation. Therefore, the main finding cannot be attributed to an improvement in the legal protection and disclosure environment of cross-listed firms.

[Insert Table 8 here]

The second explanation is access to external financing channel, as cross-listed firms are less constrained when accessing external financing to fund their investments. One country-level

variable (*ACCESS)* and two firm-level variables (*CHSIZE* and *CHDIVP*) are used as measures of access to external finance. *CHSIZE* represents the change in size from year *t*-1 to year *t*. *CHDIVP* represents the change in dividend payout, calculated as the ratio of the change in cash dividends to net income from year *t*-1 to year *t*. Similar to the two other measures of investor protection, countries are further classified as *Low* or *High ACCESS* if their index values are below or above the median value, respectively. Columns (5) and (6) of Table 8 report the estimation results of equation (1) with country, industry and year fixed effects for the two subsamples based on *ACCESS*. Although the magnitude of the interaction coefficient $Q \times ADR$ is positive and significant in both *Low* and *High ACCESS* countries (Columns (5) and (6)), the difference in the interaction coefficient $Q \times ADR$ between the *Low* and *High ACCESS* countries is not significant (*p*-value = 0.84).

For the firm-level measures, this study follows Foucault and Fresard (2012) in classifying each cross-listed firm into two groups: *Low* or *High* if its *CHSIZE* (and *CHDIVP*) value in year *t* is below or above the median value, respectively, of cross-listed firms for the year. If the change in firm size or dividend payout ratio is small, these firms are considered financially constrained, as they lack the means to access the external financing necessary to fund their investments. However, if the change in firm size or dividend payout ratio is large, these firms are considered financially unconstrained.

The interaction terms $Q \times Low$ and $Q \times High$ are then included into equation (1) and the modified equation is re-estimated with country, industry and year fixed effects. The results are presented in Columns (1) and (2) of Table 9. The interaction coefficients $Q \times Low$ and $Q \times High$ are positive and statistically significant in both columns. More relevantly, the differences in the coefficients are negative and significant for *CHSIZE*. For the external financing channel

argument to be valid in the cross-listing context, the cash savings sensitivity to stock price should be higher for financially-constrained firms than for unconstrained firms, as the former are generally more constrained in accessing the equity market to finance their investments. This is again contrary to the results in Columns (1) and (2) of Table 9. It can be inferred from the cross-sectional analysis that access to an external financing channel is probably not driving the positive association between cross-listing and the cash savings sensitivity to stock price.

[Insert Table 9 here]

The third and final explanation is the managerial learning channel. To examine whether this study's results are consistent with this explanation, the sample is partitioned into two groups for each cross-listed firm based on the analyst coverage (*ANALYST*) and firm-specific stock return variation (*RV*) in each year.[13] *ANALYST* is calculated as the natural logarithm of 1 plus the number of analysts following the firm in year *t*. The analyst following value is set at 0 if it is missing. *RV* is calculated as the logarithmic transformation of $(1- R^2/ R^2)$, where R^2 is the determination coefficient obtained from the cross-sectional regression of monthly individual stock returns on the monthly local and U.S. market returns. Once again, a cross-listed firm is classified as *Low* or *High* if its *ANALYST* or *RV* value in year *t* is below or above the median value, respectively, of cross-listed firms for the same year.

Columns (3) and (4) present the results of the modified equation (1) after including the interaction terms $Q \times Low$ and $Q \times High$, based on *ANALYST* and *RV*, respectively. If the managerial learning channel explanation is valid, the interaction coefficient $Q \times High$ should be

[13] Fernandes and Ferreira (2008) find that cross-listing indeed helps improve firm-specific return variation as measured by *RV*. However, they argue that an increased analyst following does not encourage the production of firm-specific information, as analysts typically produce information that is publicly available in the market.

higher (lower) than $Q \times Low$ for *RV* (*ANALYST*). In other words, the cash savings of cross-listed firms with *RV* (*ANALYST*) values above (below) the median are expected to respond more significantly to changes in stock price than their counterparts with *RV* (*ANALYST*) values below (above) the median. This is indeed reflected in the results shown in Columns (3) and (4). For *RV*, the magnitude of the interaction coefficient $Q \times High$ (0.013) is significantly higher than that of $Q \times Low$ (0.009) and the difference is statistically significant (*p*-value = 0.02). In contrast, the opposite is true for *ANAYST*. The increase in the cash savings sensitivity to stock price for cross-listed firms can be attributed to the higher return variation (lower analyst coverage) of these firms compared with that of the non-cross-listed firms, which supports H2a. Therefore, the managerial learning channel is probably driving the positive relation between cross-listing and cash savings sensitivity to stock price.

In summary, the findings from the cross-sectional tests suggest that as the stock prices of cross-listed firms convey more private information, they should reflect more innovations in investment opportunities. Consequently, managers' cash savings decisions are more responsive to changes in the stock prices for cross-listed firms than for non-cross-listed firms.

5. Conclusions

This paper evaluates how cross-listing decisions affect the relationship between cash savings and stock price. The main finding is that cross-listed firms display higher cash savings sensitivity to stock price than their non-cross-listed counterparts. This finding is robust to alternative regression specifications, samples, types of cross-listing, and even after controlling for possible endogeneity and self-selection bias.

Additional cross-sectional analysis reveals that the positive association between cross-listing and cash savings sensitivity to stock price is more prominent for cross-listed firms with more informative stock prices. This evidence strengthens the notion that the mechanism driving the higher cash savings sensitivity to stock price is the managerial learning channel.

In conclusion, this paper provides corroborating evidence that helps to explain the cross-country differences in the determinants of cash savings decisions. Cross-listing is one major factor that allows international firms allocate their capital to investment projects more efficiently. As a result, firms' cash savings decisions are also more sensitive to changes in stock prices.

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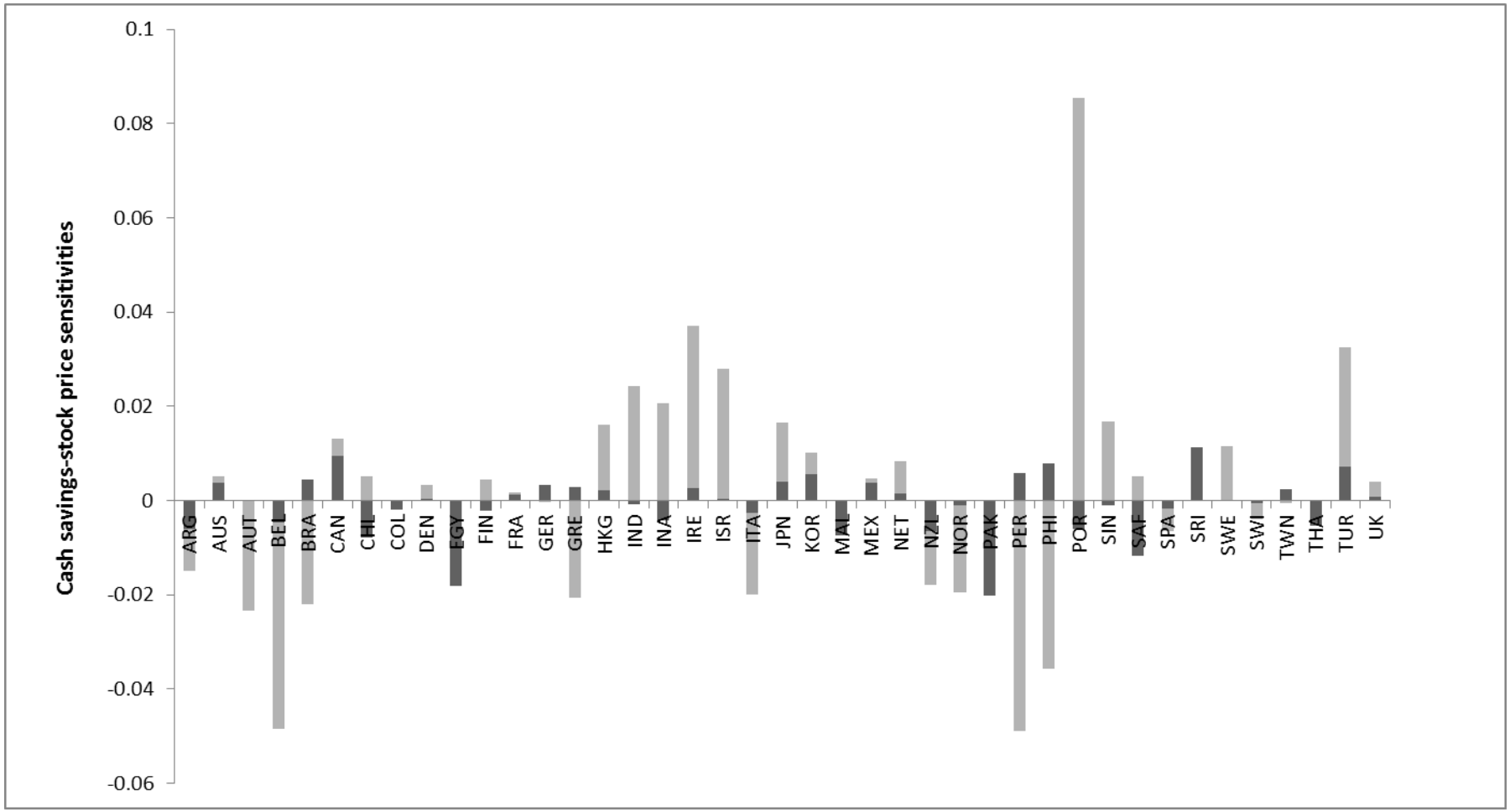
Appendix
Definitions of main variables

Variable name	Definition	Source
Country-level variables		
ACCESS	Access to external equity index.	La Porta et al. (2006)
ANTISELF	Anti self-dealing index.	Djankov et al. (2008)
LO	Legal origin dummy variable that equals 1 for common-law countries and 0 for civil law countries.	La Porta et al. (1997)
Firm-level variables		
ADR	A dummy variable that equals 1 if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt and 0 otherwise.	Various sources including the websites of Bank of New York, Citibank, NYSE, NASDAQ, etc.
OTC	A dummy variable that equals 1 if a firm is cross-listed on the U.S. OTC (over-the-counter) market and 0 otherwise.	
R144A	A dummy variable that equals 1 if a firm is cross-listed in the U.S. market via Rule 144A (private placement) and 0 otherwise.	
OTHERS	A dummy variable that equals 1 if a firm is cross-listed on other overseas (non-U.S.) stock exchanges (i.e. London Stock Exchange, Luxembourg Stock Exchange, Singapore Stock Exchange, etc.) and 0 otherwise.	
CASHR	Cash holdings, calculated as the ratio of cash and cash equivalents to total assets.	Worldscope
CHCASH	Change in cash holdings, calculated as the ratio of the annual change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*.	Worldscope
Q	Tobin's *Q*, calculated as market value of equity plus total assets minus book value of equity divided by total assets.	Worldscope
CF	Cash flow, calculated as income before extraordinary items plus depreciation and amortization divided by total assets.	Worldscope
CAPEXR	Capital investment, calculated as the ratio of capital expenditures to total assets.	Worldscope
ACQR	Acquisitions, calculated as the ratio of acquisitions to total assets.	Worldscope
CNWC	Change in net working capital, calculated as the ratio of the change in net working capital from year *t*-1 to year *t* to total assets at the end of year *t*.	Worldscope
CSTD	Change in short-term debt, calculated as the ratio of the change in short-term debt from year *t*-1 to year *t* to total assets at the end of year *t*.	Worldscope
SIZE	The natural logarithm of total assets (in USD millions).	Worldscope
CHSIZE	The change in *SIZE* from year *t*-1 to year *t*.	Worldscope
CHDIVP	Change in dividend payout, calculated as the change in the ratio of cash dividends to net income from year *t*-1 to year *t*.	Worldscope

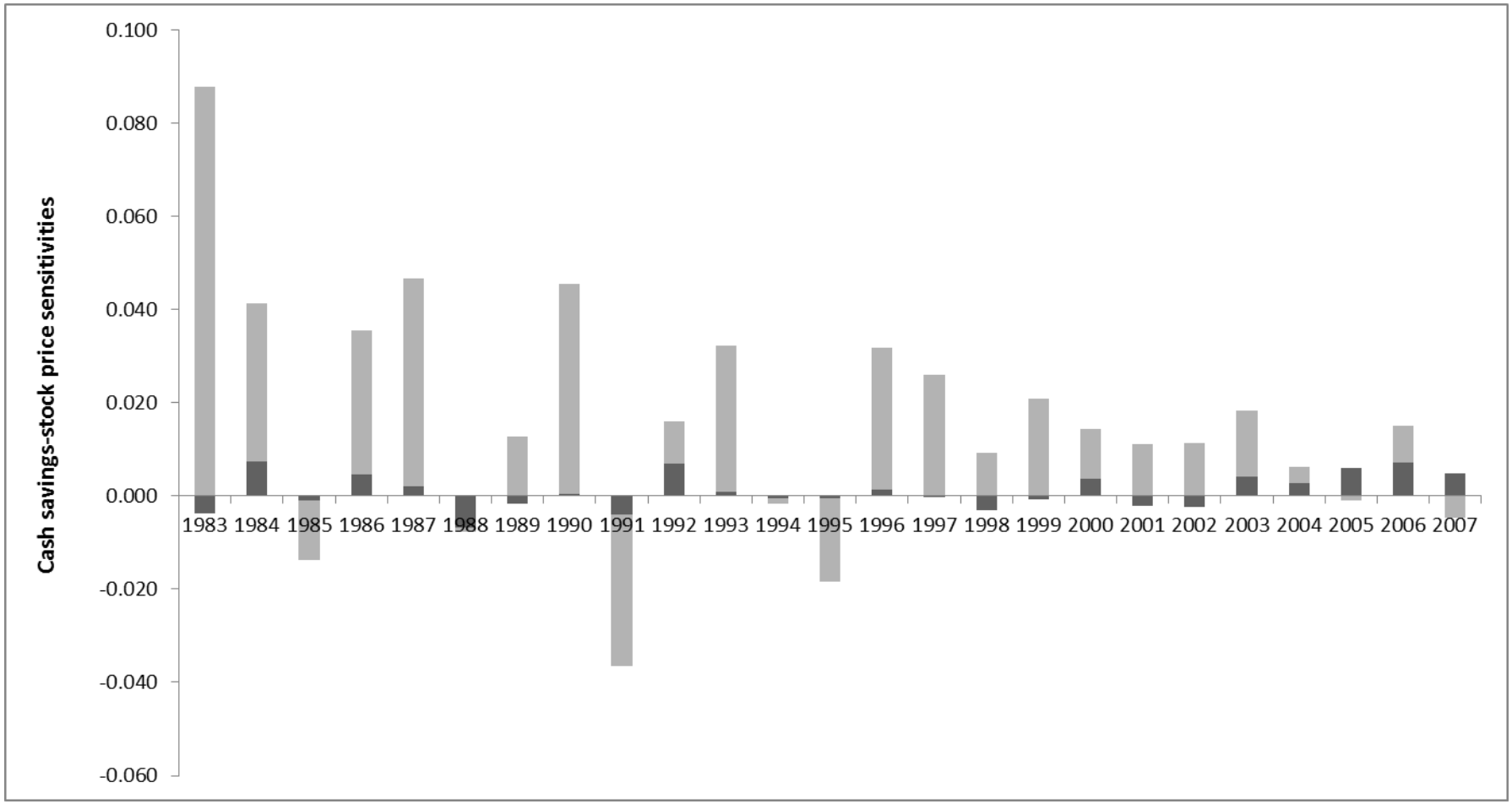
ANALYST	Analyst coverage, calculated as the natural logarithm of 1 plus the number of analysts following the firm in year *t*. The value for analyst following is set at 0 if it is missing.	I/B/E/S
RV	Firm-specific return variation, calculated as the logarithmic transformation of (1- R^2/ R^2), where R^2 is the coefficient of determination obtained from the cross-sectional regression of monthly individual stock returns on monthly local and U.S. market returns.	Datastream

Figure 1
Country-by-country estimates of the cash savings sensitivity to stock price



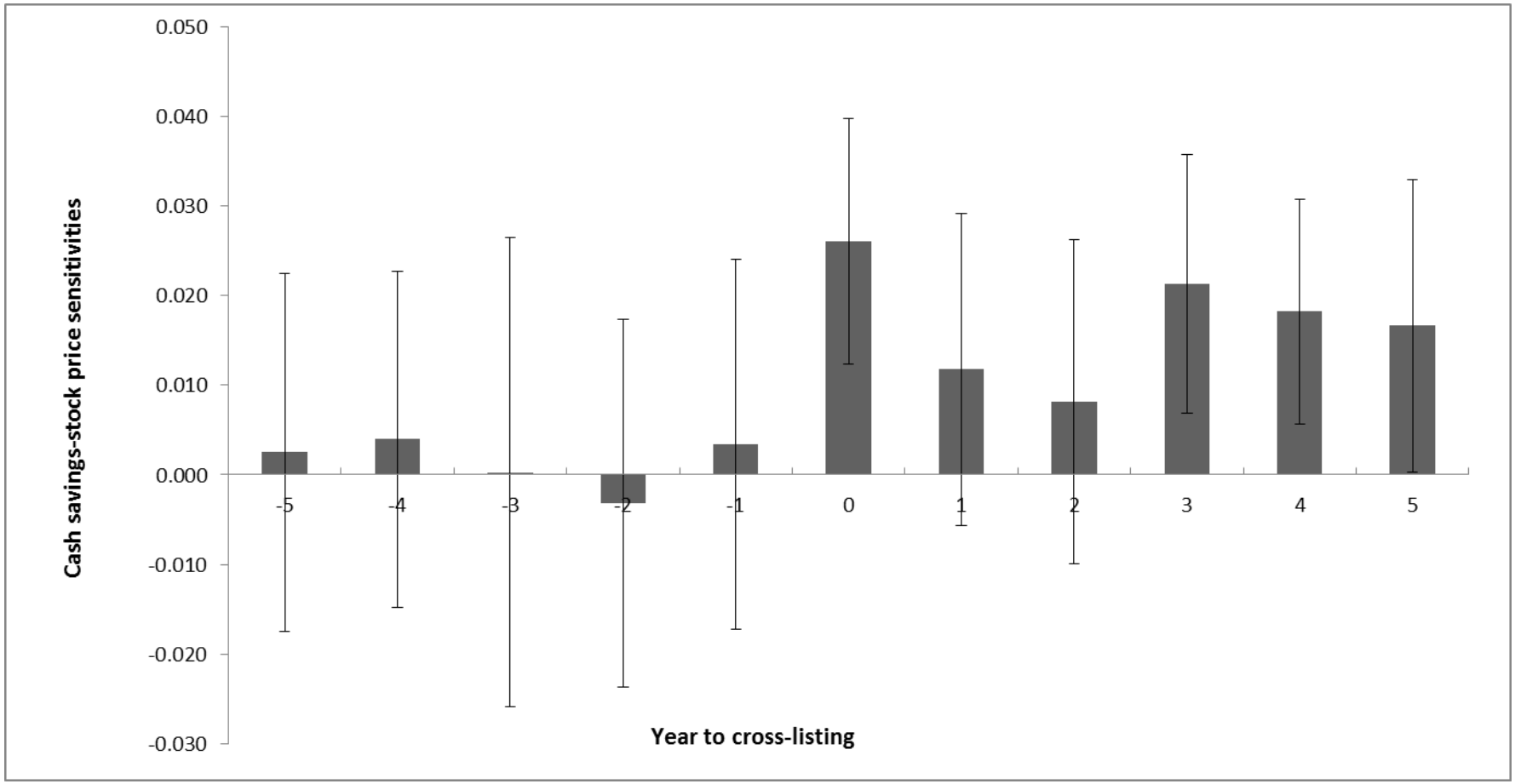
This figure presents the estimates of the cash savings sensitivity to stock price from the OLS regression of equation (1) as performed country-by-country, using industry and year fixed effects. The dark-grey bar represents the values of the coefficient *b*, while the light-grey bar represents the values of the coefficient b_1. The sample period is from 1983 to 2007.

Figure 2
Year-by-year estimates of the cash savings sensitivity to stock price



This figure presents the estimates of the cash savings sensitivity to stock price from the OLS regression of equation (1) as performed year-by-year, using country and industry fixed effects. The dark-grey bar represents the values of the coefficient *b*, while the light-grey bar represents the values of the coefficient b_1. The sample period is from 1983 to 2007.

Figure 3
Cash savings sensitivity to stock price in event time surrounding the cross-listing year



This figure presents the estimates of the cash savings sensitivity to stock price (and the 95% confidence interval) from the OLS regression of equation (1) for 5 years before and after the cross-listing year (year 0) using country and industry fixed effects.

Table 1
Sample distribution

Panel A: Distribution of cross-listed firms

Country	# Firms	# Firm-Years	Number of firms					Number of firm-years				
			ADR	*R144A*	*OTC*	*OTHERS*	*Benchmark*	*ADR*	*R144A*	*OTC*	*OTHERS*	*Benchmark*
ARGENTINA	59	387	8	2	1	0	48	85	17	5	0	280
AUSTRALIA	768	4,063	15	3	53	0	697	199	37	441	0	3,386
AUSTRIA	96	797	1	1	11	0	83	5	20	105	0	667
BELGIUM	126	1,063	1	0	1	0	124	25	0	2	0	1,036
BRAZIL	229	1,409	22	5	18	0	184	179	24	150	0	1,056
CANADA	1,078	6,727	91	0	0	0	987	882	0	0	0	5,845
CHILE	128	1,089	10	1	2	0	115	124	1	13	0	951
COLOMBIA	20	147	0	2	0	0	18	0	10	0	0	137
DENMARK	159	1,543	2	0	5	0	152	40	0	38	0	1,465
EGYPT	18	60	0	5	0	0	13	0	22	0	0	38
FINLAND	135	1,279	4	1	3	0	127	43	11	34	0	1,191
FRANCE	785	6,122	23	3	19	0	740	259	22	353	0	5,488
GERMANY	703	6,092	15	3	22	0	663	179	33	333	0	5,547
GREECE	212	734	1	4	1	0	206	7	21	8	51	647
HONG KONG	661	4,226	12	2	66	0	581	66	9	722	0	3,429
INDIA	503	3,040	9	71	6	17	400	72	567	58	0	2,343
INDONESIA	211	1,415	2	0	1	0	208	21	0	12	0	1,382
IRELAND	66	661	8	0	7	0	51	95	0	69	0	497
ISRAEL	117	532	52	1	0	0	64	228	2	0	0	302
ITALY	270	2,121	7	6	8	0	249	100	66	93	6	1,856
JAPAN	3,391	26,388	25	1	47	0	3,318	431	11	785	0	25,161
KOREA(SOUTH)	871	4,921	7	18	2	1	843	51	200	21	0	4,649
MALAYSIA	736	4,805	0	0	7	0	729	0	0	86	0	4,719
MEXICO	109	789	24	6	22	0	57	197	54	176	0	362
NETHERLANDS	205	1,999	20	1	10	0	174	236	1	120	0	1,642
NEW ZEALAND	96	574	3	0	1	0	92	28	0	20	0	526
NORWAY	168	1,184	4	0	4	0	160	25	0	57	0	1,102
PAKISTAN	88	695	0	3	0	0	85	0	17	0	0	678
PERU	52	340	1	2	1	0	48	11	22	6	0	301
PHILIPPINES	105	735	1	4	6	0	94	17	51	68	0	599

PORTUGAL	72	467	2	2	2	0	66	18	21	14	0	414
SINGAPORE	475	2,821	3	0	13	0	459	12	0	154	0	2,655
SOUTH AFRICA	284	2,296	13	4	31	0	236	154	48	340	24	1,730
SPAIN	163	1,443	2	3	3	0	155	41	12	52	0	1,338
SRI LANKA	18	111	0	1	0	0	17	0	11	0	0	100
SWEDEN	297	2,103	8	1	8	0	280	72	8	138	0	1,885
SWITZERLAND	214	2,110	7	1	4	0	202	84	25	55	0	1,946
TAIWAN	1,173	4,993	7	38	2	4	1,122	58	313	16	0	4,606
THAILAND	351	2,289	0	1	11	0	339	0	11	115	0	2,163
TURKEY	168	964	1	6	0	0	161	5	44	0	0	915
UK	1,740	14,192	75	1	67	0	1,597	928	15	771	0	12,478
TOTAL	**17,120**	**119,726**	**486**	**203**	**465**	**22**	**15,944**	**4,977**	**1,726**	**5,430**	**81**	**107,512**

Panel B: Descriptive statistics for country-level variables

COUNTRY	*ACCESS*	*ANTISELF*	*LO*
ARGENTINA	3.23	0.34	0
AUSTRALIA	6	0.76	1
AUSTRIA	4.89	0.21	0
BELGIUM	5.7	0.54	0
BRAZIL	4.05	0.27	0
CANADA	6.39	0.64	1
CHILE	4.8	0.63	0
COLOMBIA	2.78	0.57	0
DENMARK	5.87	0.46	0
EGYPT	5.2	0.2	0
FINLAND	6.37	0.46	0
FRANCE	5.75	0.38	0
GERMANY	5.93	0.28	0
GREECE	5.28	0.22	0
HONG KONG	5.5	0.96	1
INDIA	5.3	0.58	1
INDONESIA	4.53	0.65	0
IRELAND	5.29	0.79	1
ISRAEL	5.35	0.73	1
ITALY	4.41	0.42	0
JAPAN	4.92	0.5	0
KOREA(SOUTH)	5.02	0.47	0
MALAYSIA	5.11	0.95	1

MEXICO	3.9	0.17	0
NETHERLANDS	6.43	0.2	0
NEW ZEALAND	5.82	0.95	1
NORWAY	5.57	0.42	0
PAKISTAN	.	0.41	1
PERU	3.84	0.45	0
PHILIPPINES	4.62	0.22	0
PORTUGAL	4.5	0.44	0
SINGAPORE	5.5	1	1
SOUTH AFRICA	5.94	0.81	1
SPAIN	5.09	0.37	0
SRI LANKA	.	0.39	0
SWEDEN	6.15	0.33	0
SWITZERLAND	6.07	0.27	0
TAIWAN	5.54	0.56	0
THAILAND	4.24	0.81	1
TURKEY	5.03	0.43	0
UK	6.26	0.95	1
Mean	5.18	0.52	0.32
Median	5.29	0.46	
Std Dev	0.87	0.24	0.47

Panel A of this table presents the distribution of cross-listed firms for each country in the sample. Panel B of this table presents the summary-statistics for the country-level variables. Firms are either cross-listed on the U.S. exchange (*ADR*), listed via private placements (*R144A*), over the counter (*OTC*), on other overseas exchanges (*OTHERS*). *ACCESS* is the ease of access to external equity market index from La Porta et al. (2006). *ANTISELF* is the anti self-dealing index from Djankov et al. (2008). *LO* is the legal origin dummy variable, which equals one for common-law countries, and zero for civil-law countries from La Porta et al. (1997). The sample consists of 41 countries from 1983 to 2007.

Table 2
Descriptive statistics of firm-level variables

Variable	N	Mean	Median	Std Dev	25th	75th
CASHR	119,726	0.149	0.096	0.194	0.038	0.194
CHCASH	119,726	0.006	0.002	0.071	-0.018	0.029
Q	119,726	1.363	1.126	0.808	0.917	1.504
CF	119,726	0.121	0.114	0.118	0.060	0.176
CAPEXR	119,726	0.056	0.041	0.055	0.018	0.074
ACQR	119,726	0.008	0.000	0.031	0.000	0.000
CNWC	118,275	0.010	0.009	0.100	-0.032	0.052
CSTD	112,562	0.001	0.000	0.072	-0.020	0.026
SIZE	119,726	19.534	19.363	1.719	18.264	20.656

This table presents the descriptive statistics of the main firm-level variables for the pooled sample. All variables are as defined in the appendix. The sample consists of 41 countries from 1983 to 2007.

Table 3
Cross-listings and corporate cash savings

	(1) Country FE	(2) WLS	(3) FM	(4) Firm FE	(5) Country Cluster
CF	0.121***	0.129***	0.131***	0.178***	0.121***
	(37.50)	(26.77)	(24.26)	(35.89)	(13.98)
Q	0.002***	0.000	0.001	-0.002***	0.002*
	(5.46)	(0.26)	(1.31)	(-3.26)	(2.01)
ADR	-0.015***	-0.024***	-0.021***	-0.025***	-0.015***
	(-4.52)	(-4.43)	(-3.24)	(-3.72)	(-4.17)
Q×*ADR*	**0.008*** **	**0.013*** **	**0.015*** **	**0.009** **	**0.008*** **
	(4.09)	**(4.08)**	**(3.06)**	**(2.54)**	**(4.16)**
SIZE	0.000	0.001***	0.000**	0.009***	0.000
	(0.74)	(3.39)	(2.26)	(12.77)	(0.33)
Country FE	Yes	Yes	Yes	No	Yes
Year FE	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	No	Yes
N	119,726	119,726	119,726	119,726	119,726
Adj. *R*-squared	0.053	0.059	0.042	0.195	0.053

This table presents the coefficients of cash savings regressions. The dependent variable is *CHCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*-1, and 0 otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*-1. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.

* denotes statistical significance at the 10% level.

** denotes statistical significance at the 5% level.

*** denotes statistical significance at the 1% level.

Table 4
Alternative specifications

	(1) Include *CF×ADR*	(2) Include *LCASHR*	(3) Replace *Q* by *RATIO*	(4) IV	(5) Heckman
CF	0.121***	0.115***	0.133***	0.132***	0.131***
	(37.10)	(34.15)	(41.02)	(31.03)	(35.90)
Q	0.002***	0.007***		-0.001	0.002**
	(5.41)	(15.26)		(-1.37)	(2.41)
RATIO			0.002***		
			(16.11)		
ADR	-0.014***	-0.013***	0.001	-0.012***	-0.072***
	(-3.64)	(-3.41)	(0.18)	(-3.11)	(-3.39)
CF×ADR	-0.013		-0.035*		
	(-0.77)		(-1.88)		
Q×ADR	**0.008*** **	**0.009*** **		**0.006*** **	**0.038*** **
	(4.16)	**(3.72)**		**(2.71)**	**(4.52)**
RATIO×ADR			**0.005*** **		
			(3.13)		
LCASHR		-0.113***			
		(-36.64)			
CAPEXR				0.187***	
				(13.81)	
ACQR				0.405***	
				(15.30)	
CNWC				-0.105***	
				(-6.90)	
CSTD				-0.154***	
				(-4.95)	
IMR					0.022***
					(3.47)
SIZE	0.000	-0.001***	0.000***	-0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(3.52)
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	119,726	119,726	101,930	80,791	80,791
Adj. *R*-squared	0.053	0.088	0.061	0.060	0.060

This table presents the coefficients of cash savings regressions for different alternative specifications. The dependent variable is *CHCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*-1, and 0 otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*-1. *LCASHR* is calculated as the ratio of cash and cash equivalents in year *t*-1 to total assets at the end of year *t*. *RATIO* is calculated as the ratio of capital expenditures in year *t*+1 to the corresponding value in year *t*. *CAPEXR* is calculated as the ratio of capital expenditures in year *t* to total assets at the end of year *t*. *ACQR* is calculated as the ratio of acquisitions in year *t* to total assets at the end of year *t*. *CNWC* is calculated as the ratio of the change in net working capital from year *t*-1 to year *t* to total assets at the end of year *t*. *CSTD* is calculated as the ratio of the change in short-term debt from year *t*-1 to year *t* to total assets at the end of year *t*. *IMR* is the inverse mills ratio obtained from the first-stage regression of determinants of cross-listings decisions. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.

* denotes statistical significance at the 10% level.

** denotes statistical significance at the 5% level.

*** denotes statistical significance at the 1% level.

Table 5
Alternative samples and time-periods

	(1) Exclude Japan & U.K.	(2) Exclude 1997-2000	(3) 1983-1991	(4) 1992-2001	(5) Post-SOX (Year >= 2002)
CF	0.119***	0.121***	0.133***	0.129***	0.110***
	(32.51)	(34.43)	(13.87)	(24.50)	(23.91)
Q	0.002***	0.003***	-0.002	-0.000	0.005***
	(3.99)	(5.65)	(-1.24)	(-0.21)	(7.05)
ADR	-0.019***	-0.012***	-0.016**	-0.020***	-0.011***
	(-5.11)	(-3.32)	(-2.01)	(-3.48)	(-2.63)
Q×*ADR*	**0.009*** **	**0.006*** **	**0.010***	**0.013*** **	0.003
	(4.41)	**(3.00)**	**(1.84)**	**(3.46)**	(1.29)
SIZE	0.000***	0.000	0.001***	0.000**	-0.000
	(2.77)	(0.22)	(2.66)	(2.00)	(-1.37)
Country FE	Yes	Yes	Yes	No	No
Year FE	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	79,146	99,084	12,621	45,255	53,479
Adj. *R*-squared	0.049	0.053	0.057	0.061	0.046

This table presents the coefficients of cash savings regressions for alternative samples and time-periods. The dependent variable is *CHCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*-1, and 0 otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*-1. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.
* denotes statistical significance at the 10% level.
** denotes statistical significance at the 5% level.
*** denotes statistical significance at the 1% level.

Table 6
Controlling for country-level institutions

	(1) *ACCESS*	(2) *ANTISELF*	(3) *LO*
CF	0.226***	0.144***	0.143***
	(9.31)	(16.69)	(32.95)
Q	-0.005	0.004***	0.002***
	(-1.52)	(3.29)	(3.67)
ADR	-0.015***	-0.015***	-0.016***
	(-4.40)	(-4.59)	(-4.71)
Q×*ADR*	**0.008*** **	**0.008*** **	**0.008*** **
	(3.90)	**(4.14)**	**(4.19)**
Q×*Z*	0.001**	-0.002	0.000
	(2.15)	(-1.15)	(0.49)
CF×*Z*	-0.019***	-0.036***	-0.041***
	(-4.23)	(-2.72)	(-6.53)
SIZE	0.000	0.000	0.000
	(0.76)	(0.75)	(0.80)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
N	118,920	119,726	119,726
Adj. *R*-squared	0.053	0.053	0.0554

This table presents the coefficients of cash savings regressions after controlling for country-level institutions. The dependent variable is *CHCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*-1, and 0 otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*-1. *ACCESS* is the ease of access to external equity market index from La Porta et al. (2006). *ANTISELF* is the anti self-dealing index from Djankov et al. (2008). *LO* is the legal origin dummy variable from La Porta et al. (1997); which equals one for *Common* law countries, and zero for *Civil* law countries. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.

* denotes statistical significance at the 10% level.
** denotes statistical significance at the 5% level.
*** denotes statistical significance at the 1% level.

Table 7
Different types of cross-listings

	(1) *OTC*	(2) *R144A*	(3) *OTHERS*	(4) *All Listings*
CF	0.121***	0.121***	0.121***	0.121***
	(37.32)	(37.39)	(37.37)	(37.49)
Q	0.003***	0.003***	0.003***	0.003***
	(6.26)	(6.41)	(6.35)	(5.48)
ADR				-0.015***
				(-4.53)
OTC	-0.001			-0.001
	(-0.25)			(-0.46)
R144A		0.007*		0.006*
		(1.95)		(1.65)
OTHERS			0.007	0.001
			(1.11)	(0.20)
Q×ADR				**0.008*** **
				(4.05)
Q×OTC	-0.000			-0.000
	(-0.19)			(-0.03)
Q×R144A		**-0.005***		**-0.005***
		(-1.88)		**(-1.88)**
Q×OTHERS			-0.004	0.001
			(-0.81)	(0.14)
SIZE	0.000	0.000	0.000	0.000
	(0.66)	(0.50)	(0.43)	(0.97)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	119,726	119,726	119,726	119,726
Adj. *R*-squared	0.052	0.052	0.052	0.053

This table presents the coefficients of cash savings regressions for the different types of cross-listings. The dependent variable is *CCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*-1, and zero otherwise. *OTC* is a dummy variable which equals one if a firm is cross-listed on the U.S. OTC (over-the-counter) market in year *t*-1, and zero otherwise. *R144A* is a dummy variable which equals one if a firm is cross-listed in the U.S. market via Rule 144A (private placement) in year *t*-1, and zero otherwise. *OTHERS* is a dummy variable which equals one if a firm is cross-listed on other overseas (non-U.S.) stock exchange (i.e. London Stock Exchange, Luxembourg Stock Exchange, Singapore Stock Exchange, etc) in year *t*-1, and 0 otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*-1. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.

* denotes statistical significance at the 10% level.
** denotes statistical significance at the 5% level.
*** denotes statistical significance at the 1% level.

Table 8
Controlling for cross-sectional variations in country-level institutions

	(1) Low *ANTISELF*	(2) High *ANTISELF*	(3) *Civil* Law	(4) *Common* Law	(5) Low *ACCESS*	(6) High *ACCESS*
CF	0.137***	0.116***	0.142***	0.106***	0.132***	0.117***
	(22.02)	(30.90)	(32.42)	(22.97)	(27.34)	(28.53)
Q	0.001	0.003***	0.002***	0.002***	0.002***	0.002***
	(1.35)	(5.31)	(4.04)	(3.21)	(2.60)	(4.24)
ADR	-0.003	-0.019***	-0.006	-0.023***	-0.015**	-0.017***
	(-0.69)	(-4.52)	(-1.37)	(-4.49)	(-2.14)	(-4.12)
Q×*ADR*	0.000	**0.010*** **	0.002	**0.011*** **	**0.009***	**0.008*** **
	(0.12)	**(4.38)**	(0.86)	**(4.33)**	**(1.80)**	**(3.75)**
SIZE	0.001***	-0.000	0.000**	-0.000*	-0.000	0.000
	(4.30)	(-1.38)	(2.54)	(-1.93)	(-0.05)	(0.23)
p-value of difference in *Q*×*ADR*	(0.02)		(0.02)		(0.84)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N	30,605	89,121	72,778	46,948	51,910	67,010
Adj. *R*-squared	0.063	0.051	0.068	0.040	0.066	0.047

This table presents the coefficients of investment regressions after controlling for cross-sectional variations in country-level institutions. The dependent variable is *CHCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*, and zero otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*. *ANTISELF* is the anti self-dealing index from Djankov et al. (2008). *LO* is the legal origin dummy variable from La Porta et al. (1997); which equals one for *Common* law countries, and zero for *Civil* law countries. *ACCESS* is the ease of access to external equity market index from La Porta et al. (2006). Countries are classified into *Low* (*High*) *ACCESS* or *ANTISELF* if the index value is above the median value. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.

* denotes statistical significance at the 10% level.

** denotes statistical significance at the 5% level.

*** denotes statistical significance at the 1% level.

Table 9
Controlling for cross-sectional variations in firm-level financial constraints and information environment

	(1) *CHSIZE*	(2) *CHDIVP*	(3) *ANALYST*	(4) *RV*
CF	0.120***	0.121***	0.121***	0.121***
	(0.003)	(0.003)	(0.003)	(0.003)
Q	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
ADR	-0.018***	-0.019***	-0.019***	-0.018***
	(0.003)	(0.003)	(0.003)	(0.003)
Q×*LOW*	**0.006*** **	**0.009*** **	**0.014*** **	**0.009*** **
	(0.002)	**(0.002)**	**(0.002)**	**(0.002)**
Q×*HIGH*	**0.014*** **	**0.012*** **	**0.010*** **	**0.013*** **
	(0.002)	**(0.002)**	**(0.002)**	**(0.002)**
SIZE	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
p-value of: *Q*×*LOW* - *Q*×*HIGH*	(0.00)	(0.18)	(0.03)	(0.02)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	119,726	119,726	119,726	119,726
Adj. *R*-squared	0.053	0.053	0.053	0.053

This table presents the coefficients of cash savings regressions after controlling for cross-sectional variations in firm-level financial constraints and information environment. The dependent variable is *CHCASH*. *ADR* is a dummy variable which equals one if a firm is cross-listed on a U.S. stock exchange (NYSE/AMEX/NASDAQ) as an American Depository Receipt in year *t*, and zero otherwise. *CHCASH* is calculated as the ratio of the change in cash and cash equivalents from year *t*-1 to year *t* to total assets at the end of year *t*. *LOW* (*HIGH*) is a dummy variable which equals one in year *t* for a cross-listed firm if the value for each of the partitioning variable (*CHSIZE*, *CHDIVP*, *ANALYST*, or *RV*) is below (above) the median value calculated for all cross-listed firms. *CHSIZE* is the change in *SIZE* from year *t*-1 to year *t*. *CHDIVP* is calculated as the change in the ratio of cash dividends to net income from year *t*-1 to year *t*. *ANALYST* is the natural logarithm of one plus the number of analysts following a firm in year *t*. *RV* is the logistic-transformed firm-specific return variation in year *t*. All other variables are as defined in the Appendix. Standard errors are adjusted for heteroskedasticity, clustered by firm. *t*-statistics are reported in the parentheses.

* denotes statistical significance at the 10% level.
** denotes statistical significance at the 5% level.
*** denotes statistical significance at the 1% level.