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CROSS-DELISTING, FINANCIAL CONSTRAINTS AND INVESTMENT SENSITIVITIES

Gilberto Loureiro* and Sónia Silva†

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ABSTRACT

We investigate the impact of cross-delisting on firms' financial constraints and investment sensitivities. We find that firms that cross-delisted from a U.S. stock exchange face stronger post-delisting financial constraints than their cross-listed counterparts, as measured by investment-to-cash flow sensitivity. Following a delisting, the sensitivity of investment-to-cash flow increases significantly and firms also tend to save more cash out of cash flows. Moreover, this increase appears to be primarily driven by informational frictions that constrain access to external financing. We document that information asymmetry problems are stronger for firms from countries with weaker shareholders protection and for firms from less developed capital markets.

JEL Classifications: F30; F31; G15; G30

Keywords: Cross-Delisting; Financial Constraints; Information Asymmetry; Investment-to-Cash Flow Sensitivity; Investment-to-Price Sensitivity

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1. INTRODUCTION

A considerable number of studies document that cross-listing in the United States (U.S.) generates several potential benefits. For instance, by cross-listing in a U.S. stock exchange, foreign companies have to comply with more stringent disclosure standards and better legal protection of minority investors (Coffee, 1999, 2002; Stulz, 1999). Among other things, these rules can reduce opportunities for insider trading (Coffee, 2007), improve firms' access to external finance (e.g., Reese and Weisbach (2002)), relax financial constraints (e.g., Lins, Strickland and Zenner (2005)), and reduce the cost of capital (e.g., Errunza and Miller (2000), Reese and Weisbach (2002), Hail and Leuz (2009)). The required compliance with the Securities and Exchange Commission (SEC) rules represents an obvious cost for firms that cross-list in the U.S. This cost has increased after the adoption of Sarbanes-Oxley Act[1] (SOX) in 2002, making it more difficult for some foreign firms to maintain a U.S. listing. Therefore, on March 21, 2007, the SEC adopted the Rule 12h-6[2], which made it easier for a foreign firm to leave a U.S. exchange market. After the passage of Rule 12h-6, more foreign firms delisted from a U.S. stock exchange than in the post-SOX period in 2002. This regime shift motivated some recent studies to explore the determinants and the economic effects of cross-delisting (e.g., Marosi and Massoud (2008), Doidge, Karolyi and Stulz (2010), Fernandes, Lel and Miller (2010), Chaplinsky and Ramchand (2012)). However, the literature has not yet addressed the effects of delisting on firms' real investment decisions.

In this study, our purpose is to fill this gap in the literature by analyzing the real economic consequences of cross-delisting from a U.S. exchange and by investigating the post-cross-delisting financial constraints and investment sensitivities. Our study contributes to this literature in two ways. First, we document an adverse effect on the financial constraints of firms that cross-delist. For instance, after cross-delisting, firms exhibit a higher degree of financial constraints compared to the control group of firms

[1] Sarbanes-Oxley Act (SOX) is a U.S. federal law that predicts enhanced standards for all U.S. public companies.

[2] Under Rule 12h-6 of March, 21, 2007, foreign companies that have and maintain a foreign listing which is its primary trading market (for at least 12 months preceding deregistration), can qualify for deregistration if the average daily trading volume of the subject class in the U.S. for a recent 12-month period is no more than five percent of the average daily trading volume of that class of securities on a worldwide basis for the same period. Previous Rule 12g-4 applies (with an easier method of counting U.S.-resident holders), but the new eligibility conditions also apply. See http://www.sec.gov/divisions/corpfin/internatl/foreign-private-issuers-overview.shtml.

that remained cross-listed. We show empirically that the investment-to-cash flow sensitivity of cross-delisted firms is significantly higher than that of the control group of cross-listed firms. Furthermore, we examine the sensitivity of cash-to-cash flow and find evidence that cross-delisted firms, on average, save more cash out of cash flows than cross-listed firms. Second, we investigate a possible reason to explain the increase in the financial constraints post-cross-delisting – the deterioration of the information environment with the consequent rise in information asymmetry. We do so by testing how the investment sensitivity to stock prices is affected by negative informational shocks before and after the cross-delisting. We borrow the arguments of the "learning" hypothesis (e.g., Bond, Edmans and Goldstein (2012), Foucault and Frésard (2012)) and postulate that when stock prices are more informative, managers are able to make better investment decisions and, therefore, we should observe a positive sensitivity of investment to stock prices. When firms are hit by a negative informational shock, stock prices become less informative, which translate into a lower investment-to-price sensitivity. To perform this test, we use two measures that should capture the change in the informational content of stock prices: changes in bid-ask spread, and changes in the research and development (R&D) expenses. We find that a negative shock to the informational content of stock prices has a stronger impact on the investment-to-price sensitivity in the post-cross-delisting period. In other words, adverse changes in the information environment make stock prices less informative to managers, especially in the post-cross-delisting period.

We test our hypotheses using a treatment group of firms that delist at some point during our sample period – 2000 to 2012 – and two separate control groups of firms: i) a primary control group of foreign firms that remained listed in a U.S. exchange across our sample period; ii) an alternate control group of never-cross-listed firms, i.e., firms that have never been listed in any market other than the domestic market. Using the control group of never-cross-listed firms should allow us to better control for confounding effects around cross-delisting. Those confounding effects may arise from economic and financial events that are unrelated to cross-delisting, such as potential consequences of the financial crisis of 2007-2008. Thereby, our final sample consists of 583 treatment firms from 38 countries, 564 control firms that remained cross-listed throughout the sample period, and 10,397 control firms that have never been cross-listed over the sample period.

To test our main hypotheses, we first employ the Lemmon and Zender's (2010) modification test of Shyam-Sunder and Myers (1999) to show that financial constraints are different from debt capacity. Next, we employ a difference-in-differences methodology and use propensity score matching (PSM) to reduce the selection bias that might affect the baseline results. Our main results show that firms become more financially constrained after cross-delisting and that investment-to-price sensitivity reacts more negatively in the post-cross-delisting period to adverse informational shocks; our findings are robust to the use of alternative measures of investment, different estimation techniques, and alternate measures of financial constraints and information asymmetry proxies. Consistent with the "bonding" hypothesis, we also show that firms from countries with poor information disclosure requirements and weaker investor protection regimes are more penalized in their financial constraints after cross-delisting.

To the best of our knowledge, this is the first study examining the real economic effects of cross-delisting on financial constraints and investment sensitivities. The remaining of this study is organized as follows. Section 2 provides a review of the related literature and outlines our research hypotheses. Section 3 describes the data and the methodology. Section 4 presents the empirical results. Section 5 summarizes our main conclusions.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

The "bonding" hypothesis of Stulz (1999) and Coffee (1999, 2002) posits that foreign firms that cross-list in the U.S. commit themselves to higher levels of financial disclosure and transparency to meet the more stringent SEC requirements and, therefore, improve their standards of corporate governance, which helps reduce their cost of capital. The benefits from cross-listing in the U.S. (in particular on a stock exchange) are expected to be greater for firms that face more financial constraints in their home markets. Financial constraints occur when capital markets frictions impose a wedge between the costs of internal and external financing sources. Previous studies of La Porta *et al.* (1997, 1998), La Porta, Lopez-De-Silanes and Shleifer (2008), and Djankov *et al.* (2008) argue that firms are less financially constrained in economies with more developed capital markets, suggesting that those firms have more ability to take

advantage of their growth opportunities. However, as noted by Karolyi (2012), very few studies examine the corporate investment activity of U.S. cross-listed firms. Lins, Strickland and Zenner (2005) are one of the first (and one of the few) to provide evidence that firms from emerging markets improve access to external financing following a U.S. listing, thereby relaxing financing constraints. The authors document that those firms make almost no mention to capital constraints three years after their U.S. listing[3]. Their argument is that improvements (relative to a firm's home market) in shareholder protection and liquidity help reduce the effects of information asymmetry, which in turn relaxes financial constraints. To test their predictions, they use a sample of foreign listings on U.S. exchange markets, over the period 1986-1996, and employed the Fazzari, Hubbard and Petersen (1988) methodology by testing the investment sensitivity to cash flow. The intuition behind this methodology is that the sensitivity of investment to the firm's cash flow is positively related to the degree of financial constraints. When that sensitivity is higher, firms tend to pay less dividends, thus the payout ratio can be used as a proxy for the firm's level of financial constraints, as it indicates whether the firm has or not enough internal funds.

The recent increase in the number of cross-delistings from U.S. exchange markets motivates additional empirical research on the effects of such delistings. Despite the fact that compliance with SOX (of 2002) provisions have increased the cost of cross-listing, it was mainly after the passage of Rule 12h-6 of 2007 that the number of foreign firms leaving U.S. markets has spiked. The previous literature on cross-delistings is consistent with the "bonding" hypothesis by showing that when foreign firms cross-delist from a U.S. exchange they observe the contrary effect to when they cross-listed. On average, firms observe a reduction in their market value post-cross-delisting and market generally reacts negatively to deregistration[4] announcements (Marosi and Massoud, 2008; Doidge, Karolyi and Stulz, 2010; Fernandes, Lel and Miller, 2010; Hostak *et al.,* 2013). As for the reasons to cross-delist from a U.S. exchange market, we can identify in prior research two main sets of explanations (Marosi and Massoud, 2008; Doidge, Karolyi and Stulz, 2010; Fernandes, Lel and Miller, 2010). The first relates to two important changes in the regulatory environment of the U.S. markets: (i) the more

[3] Lins, Strickland and Zenner (2005) obtain this information from the notes in the annual form 20F that firms are required to file with the SEC.

[4] Deregistration is the procedure to terminate registration with the SEC, which always implies delisting from a U.S. stock exchange.

demanding regulatory requirements imposed by the SOX in 2002, and (ii) the passage of Rule 12h-6 of 2007, which made the deregistration process easier. Previous studies have found a significant negative stock price reaction to deregistration announcements before the adoption of Rule 12h-6 (e.g., Marosi and Massoud (2008)), although statistically insignificant after the Rule (Doidge, Karolyi and Stulz, 2010; Fernandes, Lel and Miller, 2010). Nevertheless, Fernandes, Lel and Miller (2010) show that the stock price reaction is significant and negative for countries with poor quality of the information environment, as well for firms from countries with weak investor protection regimes (e.g., countries with French Civil Law legal origin and with low levels of judicial efficiency). They interpret their results as being consistent with the "bonding" hypothesis; firms that deregister no longer benefit from being under the surveillance of the U.S. markets regulators.

The second set of reasons for cross-delisting and deregistration is related to the determinants and economic consequences at the firm-level. Foreign firms face a trade-off between the costs and benefits of remaining listed on a U.S. stock exchange; for some types of firms, however, the cost may outweigh the benefits. Doidge, Karolyi and Stulz (2010) find that firms that deregister have poor growth opportunities and little need for external finance. They also find that foreign firms with more agency problems have worse stock-price reactions to the adoption of the Rule 12h-6 due to investors recognizing an increase in the costs of information asymmetry.

Nevertheless, prior research has not yet documented the real economic consequences of cross-delisting, in particular the impact on corporate investment. Given this gap in the literature and taking all the above evidence together, we develop our research hypotheses about the effects of cross-delisting on firms' financial constraints and investment sensitivities. We borrow from the previous literature (e.g., Fazzari, Hubbard and Petersen (1988), Lins, Strickland and Zenner (2005)) the idea that a financially constrained firm is one that displays a significant investment sensitivity to cash flow. Consistent with previous evidence (e.g., Lins, Strickland and Zenner (2005)), cross-listing in the U.S. should allow foreign firms to relax the financial constraints they face in their home markets. If this is the case, it follows that a cross-delisting should have the reverse effect. Even when the firm's need for external financing is low, delisting from a U.S. exchange might lead to a higher cost of capital, given that the quality of the firm's information environment deteriorates as it is no longer under the

stringent disclosure requirements imposed by the SEC. Hereupon, we develop our first testable hypothesis:

Hypothesis 1: The investment-to-cash flow sensitivity should increase following a cross-delisting from a U.S. exchange market.

Almeida, Campello and Weisbach (2004) present an alternative model to test the level of financial constraints. Basically, instead of investment, they test the cash-to-cash flow sensitivity, where "cash" is given by the ratio of cash and marketable securities to total assets. The rationale to study the cash-to-cash flow sensitivity is that more constrained firms should display a systematic propensity to save cash out of cash flows. Therefore, it is not likely that the information content of cash flows over cash holdings could be attributed to its ability to predict future investment opportunities. Almeida, Campello and Weisbach (2004) argue that cash-to-cash flow sensitivity is positively correlated with proxies for financial constraints and that this relation is systematically stronger and less ambiguous than what we can observe using instead the investment-to-cash flow sensitivity. This argument leads us to our second hypothesis:

Hypothesis 2: The cash-to-cash flow sensitivity should increase following a cross-delisting from a U.S. exchange market.

According to the "bonding" hypothesis, foreign firms that cross-list in the U.S., in particular on exchange markets, benefit from an improvement in their information environment (Coffee, 1999, 2002; Stulz, 1999). This improvement allows not only firms to become more transparent to outside investors, but also stock prices become more informative to insiders, as traders from both markets (domestic and foreign) can impart information about the firms' growth prospects. Foucault and Frésard (2012) use this argument to show that managers can learn from more informative stock prices and use that "learning" to make better investment decisions. Empirically, this would result in a higher sensitivity of investment to stock prices (Durnev, Morck and Yeung, 2004; Chen, Goldstein and Jiang, 2007) after the cross-listing (Foucault and Frésard, 2012). Indeed, the fact that firms can attract more foreign investors, especially from countries that are relevant for the firm's growth opportunities (as shown in Loureiro and Taboada (2015)),

can improve the information quality of stock prices as outsiders impound new information into prices that was not known to managers. In the particular context of cross-listings, Foucault and Frésard (2012) show that foreign firms that cross-list in a U.S. exchange observe an increase in their investment-to-price sensitivity. We posit that a reverse effect should occur when foreign firms delist from a U.S. stock exchange, in particular for those that observe a deterioration in their information environment. As noted by Foucault and Frésard (2012), some foreign firms may delist from U.S. markets just because the gain in terms of stock price informativeness has decreased and is no longer relevant. In those cases, we should not observe any effect on the investment-to-price sensitivity post-cross-delisting. However, many firms may cross-delist for other unrelated reasons and lose the "bonding" benefits of being cross-listed, thus deteriorating their information environment. Those firms would face more informational frictions after cross-delistings, increase the levels of information asymmetry, and reduce the quality of stock price informativeness for managers. Therefore, for firms that suffer a negative informational shock we would expect a decrease in the sensitivity of investment to stock prices. Based on these ideas we formulate our last hypothesis:

Hypothesis 3: The adverse effect of cross-delisting on investment-to-price sensitivity should be positively correlated to the increase in firm's information asymmetry post-cross-delisting.

3 DATA AND METHODOLOGY

3.1 Data

Starting from the universe of foreign firms cross-listed on the major U.S. stock exchanges, we identified all cross-delistings that occurred between 2000 and 2012[5]. We use firms listed on major stock exchanges to ensure better data availability and more uniform listing requirements. We obtain a list of all foreign firms with equity shares registered and reporting with the SEC from the SEC's website. Next, we search on

[5] Our sample period starts in 2000 because information about foreign firms registered and reporting with the SEC is not available in 1995 and in 1999 at the SEC's website.

EDGAR's archive[6] for all Form 15's filed between 2000 and 2012. With this information, we track firms that delisted during our sample period. Most firms traded in the U.S. issue American Depositary Receipts[7] (ADRs), which are managed by a U.S. depositary bank such as the Bank of New York or Citibank. Thereby, we complement the data obtained from SEC's sources with these obtained from the websites of New York Stock Exchange (NYSE), NASDAQ, Over-The-Counter Bulletin Board (OTCBB) and Over-The-Counter (OTC) Markets Portal. Information from all different sources is manually cross-checked. Firms that move from one major exchange to another are not treated as delisted, whereas firms that delist from an exchange market and move to an OTC market or "Pink Sheets" are treated as delisted.

For each firm, we collect the market value of equity, total assets, capital expenditures, sales, cash flows, and additional variables used in the empirical tests for the sample period. We exclude financial firms (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4949) because their accounting figures are ruled by special statutory requirements. To reduce the effect of outliers, all the variables are winsorized at the 1% in each tail of the distribution. All variables in U.S. dollars are Consumer Price Index (CPI) adjusted considering 2000 prices.

We further eliminate observations with negative or missing information on sales, market value, capital expenditures, book value of equity, and debt. Following prior literature (e.g., Loureiro and Taboada (2015)), we exclude firms with total assets lower than $10 million to make firms more comparable across countries. We exclude firms that only listed in 2012 because we required at least two years of observations.

We collect financial data from the Worldscope database. Bond rating information is from the Securities Data Corporation (SDC) database. Industry- and country-level variables are collected from a variety of other sources. All variables are described in detail in Appendix A.

This data screening procedure results in a final longitudinal panel of 583 treatment firms from 38 countries, a primary control group of 564 firms that remained cross-listed over the sample period, and an alternate control group of 10,397 firms that have never

[6] Electronic Data Gathering, Analysis, and Retrieval system (EDGAR's) provided by the SEC.

[7] Foreign firms can obtain or issue equity financing by using Level 1, 2 or 3 ADRs. Level-1 ADR it is the only ADR' Level is quoted on the OTC market. A level-2 ADR provides shares listed and traded on the U.S. exchange markets. The Level-3 ADR is used when a company has made a public offering in the U.S. Our sample includes only Level-2 and Level-3 ADRs.

been cross-listed over our sample period 2000-2012, nor in the three years prior to the beginning of the period.

3.2 Sample Description

Table 1 describes our sample by country, including the number of observations and the number of firms that have been cross-listed on U.S. exchange markets from 2000 to 2012. Additionally, we provide the same information for the treatment group, and the two control groups of cross-listed and never-cross-listed firms.

[Insert Table 1 here]

Overall, the main sample comprises 1,147 foreign firms, 583 treatment (cross-delisted) firms and 564 control (cross-listed) firms. Aiming to address confounding effects around delisting event, we also use an alternate control sample of 10,397 purely domestic listed firms (the "never-cross-listed" control group). Hence, the treatment group has 4,187 firm-year observations, the primary control group of cross-listed firms counts for 4,891 firm-year observations, and the alternate control group of never-cross-listed firms counts for 87,965 observations.

Overall, most of the cross-delisted firms are from Common Law countries[8] (61.8%), followed by French Law countries (21.4%) in the middle, and German-Scandinavian Law countries (16.8%) in the bottom.

Table 2, Panel A, provides descriptive statistics for the main firm-level variables by treatment group, control group of cross-listed firms, and control group of never-cross-listed firms. Panel B of Table 2 reports univariate tests of the difference in means and medians between treatment and control groups, for all the main variables.

[Insert Table 2 here]

In Panel A of Table 2 we observe that the treatment group displays, on average, lower total assets, lower *Q* and *Sales Growth* (i.e., lower growth opportunities), and lower corporate profitability (*ROA*) than the control group of cross-listed firms. The average investment ratio is also lower for treatment firms, however this difference is statistically significant but not economically large. Treatment firms are more levered, and display higher probability of financial distress (measured by *O-Score*) when

[8] We follow La Porta, Lopez-De-Silanes and Shleifer (2008) and assign firms according to the legal origin of domestic markets.

comparing with cross-listed firms. Panel B of Table 2 shows that the differences in means and medians between treatment and control group of cross-listed firms are statistically significant at the 1 percent level, except for *Financing Deficit* that is insignificant.

Regarding the comparison between treatment firms and never-cross-listed firms, on average, treatment firms are larger, have higher *Q*, and higher leverage, but are less profitable (*ROA*) than never-cross-listed firms. Moreover, the differences between treatment and control group of never-cross-listed firms are statistically significant at the 1 percent level.

3.3 Measuring the investment-to-cash flow sensitivity

To test hypothesis 1 – that investment-to-cash flow sensitivity is expected to increase post-cross-delisting – we follow the previous literature (e.g., Fazzari, Hubbard and Petersen (1988), Lins, Strickland and Zenner (2005)) and employ a difference-in-differences methodology. Our baseline specification is the following equation:

$$I_{i,t} = \alpha_i + \beta_1 CF_{i,t} + \beta_2 Treat_i + \beta_3 Delist_{i,t} + \beta_4 CF_{i,t} \times Treat_i \times Delist_{i,t} + \\ + \beta_5 CF_{i,t} \times Treat_i + \beta_6 CF_{i,t} \times Delist_{i,t} + \beta_7 Delist_{i,t} \times Treat_i + \gamma_1 Q_{i,t-1} + \\ \gamma_2 SIZE_{i,t-1} + \lambda_k + \eta_j + \gamma_t + \varepsilon_{i,t} \quad (1)$$

where the dependent variable $I_{i,t}$ is a measure of corporate investment for firm *i* in year *t*. In most of regressions, $I_{i,t}$ is measured as the ratio of capital expenditures scaled by lagged property, plant and equipment (PPE). $CF_{i,t}$ is the net income plus depreciation and amortization expenses scaled by lagged total assets. $Treat_i$ is an indicator variable equal to one if firm *i* is included in our treatment group, and zero otherwise. $Delist_{i,t}$ is an indicator variable equal to one if treatment firm *i* is delisted in year *t*, and zero otherwise. $Q_{i,t-1}$ controls for growth opportunities and corresponds to normalized stock price, measured as the market value of equity plus the book value of assets minus the book value of equity scaled by the book value of total assets. The variable $SIZE_{i,t-1}$, the logarithm of total assets, is included to control for the impact of firm size on corporate investment decisions. In our main regressions we also include dummies to control for

country, λ_k, industry[9], η_j, and year, γ_t. Because of fixed effects framework, some of the coefficients in Equation (1) drop out due to collinearity.

Regarding our baseline specification (1), the main coefficient of interest is β_4 $(CF_{i,t} \times Treat_i \times Delist_{i,t})$, which captures the change in investment-to-cash flow sensitivity following the cross-delisting event for our treatment group, relative to the control groups. Per hypothesis 1, we predict a positive coefficient β_4, which means an increase in investment-to-price sensitivity after cross-delisting.

3.4 Financial Constraints Criteria

Financial constraints are more severe the higher is the information asymmetry of the firm, which can lead to credit rationing when accessing external financing sources. There is, however, a fine line between financially constrained and unconstrained firms. If we define a financially constrained firm as one for which it is more difficult to obtain external rather than internal financing, then virtually, all firms could be classified as so (Kaplan and Zingales, 1997). Therefore, there is a comprehensive number of approaches to sort firms into financially constrained and unconstrained categories. Since we do not have strong prior empirical evidence about which approach is the best, we start with five alternative criteria to assign firms in constraint and unconstraint groups.

i) *Payout ratio*. We use this measure in the spirit of Fazzari, Hubbard and Petersen (1988), and compute it following Almeida, Campello and Weisbach (2004) as the ratio of total distributions to shareholders (both dividends and stock repurchases) divided by the operating income (see Appendix B). Every year, firms are classified as financially constrained (unconstrained), whenever they are in the bottom (top) three deciles of annual payout, respectively.

ii) *KZ* index. Proposed by Lamont, Polk and Saá-Requejo (2001) and based on empirical results of Kaplan and Zingales (1997), this index was applied to our data through a linearization process described in Appendix B. Firms in the top (bottom) three deciles of the KZ index are considered financially constrained (unconstrained). We allow firms to change their financial constraints status over our sample period.

[9] We assign firms to industries using the classification scheme of Fama and French (1997), based on 48 industry portfolios.

iii) *WW index*. Proposed by Whited and Wu (2006); similar to what we did for the KZ index (see Appendix B), we consider firms in the top (bottom) three deciles of the WW index as financially constrained (unconstrained), respectively. Again, we allow firms to change their financial constraints status over the sample period.

iv) *SIZE.* Measured as the logarithm of total assets, SIZE has been used in the literature as a proxy for financial constraints (e.g., Gilchrist and Himmelberg (1995)); we follow this literature and classify firms as financially constrained (unconstrained) if the size of their assets is in the bottom (top) tercile.

v) *BOND RATING*. In line with Almeida, Campello and Weisbach (2004), we collected data on firms' bond ratings and classify those firms that have never had their public debt rated during our sample period as financially constrained, provided that they have some public debt outstanding. However, the lack of information for most of the firms in our sample led us to adopt an alternative approach. Earlier studies (e.g., Whited (1992), Kashyap, Lamont and Stein (1994), Gilchrist and Himmelberg (1995), Almeida, Campello and Weisbach (2004), Lemmon and Zender (2010)) interpret the presence of rated debt as a signal that firms can access relatively low-cost debt markets, suggesting a large debt capacity. We must notice though that some firms may simply chose not to issue (rated) debt, although they have the capacity to do so. To minimize these concerns, we follow Lemmon and Zender (2010) and use a predictive (logit) model of whether a firm has a bond rating in a given year. The dependent variable is one if a firm has a debt rating in a given year, and zero otherwise. The covariates in the logit regression are *SIZE* (log of total assets), *ROA* (earnings before interest and taxes scaled by total assets), the *Fixed Assets* ratio (measured as property, plant, and equipment scaled by total assets), the (*Tobin's*) *Q* (normalized stock price, measured as market value of equity plus book value of assets less book value of equity scaled by book value of total assets), the *Leverage* ratio (total debt scaled by total assets), *AGE* (the logarithm of the number of years since the firm first appeared on Datastream), and the *Standard Deviation* (STDEV) of stock returns. All of the covariates are lagged one period[10] and are described in Appendix A. Firms are classified as financially constrained (unconstrained) if the estimated

[10] We also include industry, year and country fixed effects.

probability of having a rated debt falls into the bottom (top) terciles of the distribution.

Table 3 presents summary statistics on the level of investment and cash holdings of financially constrained and unconstrained firms. Using the *Payout Ratio*, *WW* index, *SIZE*, and *Rating* criteria, we observe that financially constrained firms invest more and hold more cash than unconstrained firms. This difference is statistically significant, except for investment when we classify firms based on the *WW* index. Using the *KZ* index gives quite different results: more financially constrained firms as the ones that invest less and hold less cash.

[Insert Table 3 here]

From the results in Table 3, we conclude that it seems more reliable to use *Payout ratio*, *SIZE* and *Rating*, rather than *KZ* or *WW* indexes, to classify firms in terms of their level of financial constraints. In fact, some studies also claim that *KZ* index is not a reliable measure (Almeida, Campello and Weisbach (2004); Chang and Song, 2013); as for the *WW* index, because it includes *SIZE*, which is already by itself a measure for financial constraints, may also be a limitation. Another valid concern is to assess whether these proxies measure financial constraints or just debt capacity. If a firm is financially unconstrained it is more likely to fund its financing deficit with debt than to issue equity, while for a financially constrained firm that has restricted access to bond markets it is more likely to fund its deficit issuing equity (e.g., Lemmon and Zender (2010), Chang and Song (2013)). Assuming that debt capacity holds constant, firms should use debt to fund small financing deficits, but will choose equity when external financing needs start to increase (Lemmon and Zender, 2010). Therefore, we employ the Lemmon and Zender (2010) modification test of Shyam-Sunder and Myers (1999) to test the quality of our measures of financial constraints controlling for debt capacity concerns. Hence, we will test the following equation:

$$\Delta LEV_{i,t} = \alpha_i + \beta_1 Financing\ Deficit_{i,t} + \beta_2 Financing\ Deficit_{i,t}^2 + \lambda_k + \eta_j + \gamma_t + \varepsilon_{i,t} \quad (2)$$

where $\Delta LEV_{i,t}$ corresponds to changes in the *Leverage* ratio, measured as total debt (short-term plus long-term debt) scaled by total assets, of firm *i* in year *t*.

$Financing\ Deficit_{i,t1}$ is the sum of dividends, net investments and net changes in working capital minus internal cash flows, scaled by lagged total assets (see Frank and Goyal (2003)). λ_k controls for the country effects. η_j controls for the industry effects. γ_t controls for the year effects.

According to Lemmon and Zender (2010), firms with no concerns over debt capacity will use essentially debt to cover their financial deficit, therefore, β_1 should be positive and significant[11], whereas firms with more concerns over debt capacity (i.e., more financially constrained firms) will only use debt to cover small deficits and issue equity to cover larger deficits. That being the case, we should expect β_2 to be negative and statistically significant and β_1 still positive, but weakly or not statistically significant. Assuming that financial constraints and debt capacity are closely related, i.e. firms with less concerns over debt capacity should be less financially constrained, we use equation (2) to infer about the quality of our measures of financial constraints. We do so by estimating equation (2) on groups of financially constrained and unconstrained firms classified according to our proxies – *Payout ratio*, *KZ* index, *WW* index, *SIZE*, and *Rating*. If our measures are good at identifying firms with more limited debt capacity, then we should observe a negative and statistically significant coefficient β_2 in the group of financially constrained firms. It is worth noting, however, that limited debt capacity is just a form of financial constraints (Lemmon and Zender, 2010). Other aspects, such as higher levels of information asymmetry between insiders and investors are also expected to increase financial constraints (Chang and Song, 2013).

In Table 4 we show estimations of equation (2) using subsamples of constrained and unconstrained firms classified upon our main proxies of financial constraints.

[Insert Table 4 here]

The results indicate that firms classified as financially constrained are indeed those with lower debt capacity as the coefficients β_2 are negative and statistically significant, whereas coefficients β_1 are insignificant. This is true for all measures except for the *KZ* and *WW* indexes. Therefore, hereafter, we will rely on the *Payout ratio*, *SIZE*, and *Rating* as our main measures of financial constraints.

[11] Note that Lemmon and Zender (2010) assume pecking order firms; thus, provided that firms have debt capacity, financing deficits will first be funded by debt.

4. EMPIRICAL RESULTS

4.1 Investment-to-Cash Flow Sensitivity Following Cross-Delisting from U.S. Exchange Markets

To test whether investment-to-cash flow sensitivity increases post-cross-delisting (hypothesis 1), we estimate several alternative specifications of equation (1). Table 5 shows the results.

[Insert Table 5 here]

As in previous studies (e.g., Fazzari, Hubbard and Petersen (1988), Lins, Strickland and Zenner (2005)), we find that investment is positively related with cash flow. The coefficient β_1 ($CF_{i,t}$) is statistically significant across all models. Consistent with our first hypothesis, we predict a positive and statistically significant coefficient β_4 ($CF_{i,t} \times Treat_i \times Delist_{i,t}$), suggesting that post-cross-delisting firms will face more restrictions to access external financing, thus making investments more dependent on internal sources. The coefficient β_4 captures the changes in investment sensitivity to cash flow after cross-delisting for our treatment group, relative to the control groups of cross-listed and never-cross-listed firms. Using our baseline (model (1)) as an example, a one-standard-deviation increase in $Cash\ Flow$ (0.17 – see Panel A of Table 2) represents an increase of 0.009 in investment prior to the cross-delisting event for the average treatment firm, which is associated with a 2.8% increase in investment[12]. In the post-cross-delisting, the increase in investment associated with a one-standard-deviation increase in $Cash\ Flow$ is 0.0422, which corresponds to a 14.1% increase[13].

The coefficients of *SIZE* and Q have the expected sign: $Q_{i,t-1}$ is positively related with investment because it captures the growth opportunities, and $SIZE_{i,t-1}$ is negatively related with investment suggesting that larger firms tend to invest significantly less as a percentage of total assets.

We estimate different specifications of equation (1) to check the robustness of our baseline results. In model (2), we cluster standard errors at country- and year-level, and in model (3) we use firm fixed effects, instead of country and industry fixed effects.

[12] The sum of coefficients is (0.2366+-0.1864) x 0.17=0.0085. The mean of our investment variable is 0.30 (from Panel A of Table 2). Therefore, a 0.0085 increase is equivalent to a 2.8% (0.0085/0.30) increase in investment.

[13] The sum of coefficients is (0.2366+0.1979+-0.1864) x 0.17=0.0422. Thus, a 0.0422 increase is equivalent to a 14.1% (0.0422/0.30) increase in investment.

Results in both models are similar in sign and magnitude to the ones shown in the baseline model.

In model (4) we use a matched sample of treatment and control group of cross-listed firms. This robustness check is justified due to the construction of our treatment and control groups, which raises several concerns. For instance, the decision to cross-delist can be involuntary or voluntary[14], meaning that, in general, firms are not randomly assigned to the treatment group; thus, in our analyses we need to deal with potential sample selection biases. The act of cross-delisting, *per se*, is a quasi-experiment where we can identify a treatment group of companies that cross-delist, and a control group not subject to the same treatment. One problem in quasi-experimental studies is that one is not able to observe the counterfactual, i.e., there may be some omitted variables that simultaneously affect the decision to cross-delist and our outcome variables (e.g., firms' investment decisions). Therefore, we use the propensity score matching (PSM) methodology proposed by Rosenbaum and Rubin (1983). In the PSM procedure we match each treatment firm to a control firm in the same industry, country, year, and with the closest *SIZE* (which is also one of our financial constraints criterion); we use PSM technique selecting the nearest neighbor with replacement[15], to find the best match(es) for each treatment firm[16].

As shown in model (4), the results are very similar to what we find when using a non-matched control sample, namely we still find a positive and statistically significant β_4.

To mitigate concerns about confounding events (e.g., changes in economic or regulatory environment that are unrelated to the cross-delisting event) around the same time of cross-delisting, we estimate our baseline model using a control sample of non-matched (model (5)) and matched (model (6)) sample of never-cross-listed firms. The results are similar to what we found before.

In Panel B of Table 5 we estimate equation (1) using two different measures of corporate investment: i) capital expenditures scaled by lagged total assets minus cash

[14] Firms can be forced to delist from U.S. exchange markets due to disqualification to continue listed. See http://nysemanual.nyse.com/lcm/ and http://nasdaq.cchwallstreet.com.

[15] We apply matching technique with nearest neighbor and caliper, which corresponds to a propensity score range. The proper caliper was computed following Wang *et al.* (2013), and corresponds to 0.2 of propensity score standard deviation.

[16] The quality of matching is tested using the Likelihood-Ratio (LR) chi^2 test, which tests the goodness-of-fit of the probit model used in the propensity score estimation; if the propensity score is the most suitable one, the coefficients of such specification should not be significantly different from zero.

and short-term investments[17]; ii) assets growth. Assets growth captures all investment activities, such as acquisitions and divestitures[18]. We estimate the regressions using the same type of control samples – matched and non-matched cross-listed and never-cross-listed firms. Once again, the results show coefficients of the same sign and similar statistical to the ones uncovered before.

Taken together, the results in Table 5 provide strong evidence supporting hypothesis 1.

4.1.1 Investment-to-Cash Flow Sensitivity: Additional Robustness Checks

We proceed our robustness checks by analyzing the reasons why firms cross-delist and how they may interfere with the positive effect on investment-to-cash flow sensitivity post-cross-delisting documented in the previous section. Foreign firms may cross-delist from U.S. exchange markets for a variety of reasons and motivations. We first divide cross-delisted firms in two groups, depending on whether the delisting was voluntary or involuntary. Cross-listed firms in the U.S. can be suspended and involuntarily delisted from U.S. exchange markets due, for example, to violations of stock exchanges rules, while others may decide to voluntarily cross-delist even if they meet the requirements imposed by the markets' regulators. After the passage of Rule 12h-6 of 2007, cross-delisting became easier and less costly, thus a larger and more diversified number of firms voluntarily cross-delisted; this would happen whenever the anticipated gains did not cover the costs of remaining listed on a U.S. stock exchange. Therefore, we further subdivide voluntary cross-delisting into two different periods: pre- and post- the passage of Rule 12h-6. We estimate equation (1) by each group and show the results in Table 6.

[Insert Table 6 here]

In models (1) to (4) we observe that the coefficient β_4 of the main variable of interest ($CF_{i,t} \times Treat \times Delist_{i,t}$), is positive and statistically significant. In line with the results uncovered in the previous section, those results show that post-cross-delisting the investment-to-cash flow increased, suggesting that these firms became more

[17] The denominator of this investment measure (total assets minus cash and short term investments) reflects the invested capital.

[18] Kumar and Ramchand (2008) provide evidence that over 40% of their sample of cross-listed firms in U.S. exchange markets acquire a U.S. local firm after they cross-list.

financially constrained. The magnitude of coefficient β_4 is larger for the group of involuntary cross-delistings – 0.252 versus 0.219 for the group of voluntary cross-delistings; both statistically significant at the 10 percent level.

In models (5) to (8) of Table 6, we estimate the same regressions on subsamples of voluntary cross-delistings of firms from Common Law and Civil Law countries, following the typical classification of previous literature (e.g., La Porta *et al.* (1997; 1998), La Porta, Lopez-De-Silanes and Shleifer (2008), Djankov *et al.* (2008)) and assign firms according to the legal origin, i.e., from Common Law countries in the high group of shareholder protection and firms from Civil Law[19] countries in the low group. We find no significant change in investment-to-cash-flow sensitivity after cross-delisting for firms from Common Law countries. This evidence is consistent with the argument that firms from Common Law countries have already stronger investor protection regimes and stronger information disclosure requirements than firms from Civil Law countries, which facilitates the access to external financing in their home markets. This is also consistent with the "bonding" hypothesis that predicts a lower marginal benefit of cross-listing in the U.S, for firms coming from countries with better shareholder protection. Similarly, the reverse effect of cross-delisting should be less severe for firms from these same types of countries.

To address concerns of possible confounding events occurring in the post-cross-delisting period for a considerable number of firms that can also affect their investment-to-cash flow sensitivity[20], we perform a robustness check to test the validity of our identification strategy. If the increase in investment-to-cash flow sensitivity following cross-delisting is associated with the cross-delisting event, this increase should emerge around the delisting event and be persistent after that. To test this prediction we follow previous studies (Hail, Tahoun and Wang, 2014; Loureiro and Taboada, 2015) and create the following indicator variables: the pre-delisting event (*Pre Event*) – a dummy variable that is one for years *t-2* and *t-1* relative to delisting event, and zero otherwise; the delisting event (*Event*) – a dummy variable that is one for year *t* relative to delisting event, and zero otherwise; and the post-delisting event (*Post Event*) – a dummy

[19] Firms assigned in the low group are from French Civil Law countries.

[20] One example would be the financial crisis of 2007-2008. If a considerable number of firms cross-delisted before or around the financial crisis, then the increase in investment-to-cash sensitivity may be driven by the post-crisis negative impact on firms' financial constraints than by the cross-delisting event.

variable that is one for years *t+1*, *t+2, and t+3* relative to delisting event, and zero otherwise. We interact each of the indicator variables (*Pre Event*, *Event*, and *Post Event*) with $CF_{i,t}$ and estimate equation (3) using only the treatment sample.

$$I_{i,t} = \alpha_i + \beta_1 CF_{i,t} + \beta_2 Pre\ Event_{i.t} + \beta_3 Event_{i,t} + \beta_4 Post\ Event_{i,t} + \beta_5 CF_{i,t} \times Pre\ Event_{i,t} + \beta_6 CF_{i,t} \times Event_{i,t} + \beta_7 CF_{i,t} \times Post\ Event_{i,t} + \gamma_1 Q_{i,t-1} + \gamma_2 SIZE_{i,t-1} + \lambda_k + \eta_j + \gamma_t + \varepsilon_{i,t} \quad (3)$$

where $I_{i,t}$ is measured as the ratio of capital expenditures scaled by lagged PPE. $CF_{i,t}$ is the net income plus depreciation and amortization expenses scaled by lagged total assets. $Pre\ Event_{i,t}$, $Event_{i,t}$, $Post\ Event_{i,t}$, are the same as before. $Q_{i,t-1}$ is the market value of equity plus the book value of assets minus the book value of equity scaled by the book value of total assets. $SIZE_{i,t-1}$ is the logarithm of total assets. Regresssions include year, country and industry fixed effects.

To be consistent with previous results, we expect the coefficient β_5 to be insignificant and the coefficients β_6 and β_7 to be positive and statistically significant, meaning that the increase in investment-to-cash flow sensitivity should occur after the cross-delisting event. Table 7 shows the results.

[Insert Table 7 here]

We estimate equation (3) considering the treatment group (model (1)) and the subsample of voluntary cross-delistings (model (2)). According to our expectations, the coefficients β_6 and β_7 are positive and significant across models.

Overall, these findings provide support to our hypothesis 1, i.e., that increase in investment-to-price sensitivity materializes after the cross-delisting event.

As a last robustness test, we use a matched sample of treatment and control group of cross-listed firms based on the same covariates of model (4) of Table 5, but instead of *SIZE*, we use the other financial constraints criteria as covariates: the *Payout Ratio* and *Rating*. Once again, we estimate the propensity scores based on year, industry, country and on the two alternate financial constraints, using the nearest neighbor technique (with replacement). Table 8 shows the results.

[Insert Table 8 here]

As shown in Table 8, the results are very similar to what we find in our baseline specification; we still uncover a positive and statistically significant β_4. This additional test corroborates our previous results and also gives additional evidence on support of hypothesis 1.

4.2 Cash-to-Cash Flow Sensitivity around and Following Cross-Delisting from U.S. Exchange Markets

Our prior results show an increase in investment sensitivity to cash flow after cross-delisting that we interpreted as firms becoming more financially constrained post-cross-delisting. However, even in the absence of financial constraints, we may observe a positive relationship between investment and cash flow if cash flows contain information about the relation between investment demand and growth opportunities. Thus, following Almeida, Campello and Weisbach (2004), an alternative is to test the sensitivity of cash holdings (rather than investment) to cash flow. The authors show that financial constraints are related to a firm's propensity to save cash out of cash inflows, which they refer to as the cash flow sensitivity of cash. Thus, financially unconstrained firms should not display a systematic propensity to save cash, while firms that are constrained should have a positive cash-to-cash flow sensitivity. One advantage of using this model rather than the investment-to-cash flow sensitivity is to avoid concerns of potential multicollinearity problems when including Q and $Cash\ Flow$ because both variables capture growth opportunities. Therefore, there is a stream of literature initiated by Kaplan and Zingales (1997) that argue that the higher investment-to-cash flow sensitivity of constrained firms documented by Fazzari, Hubbard and Petersen (1988) probably is being affected by a measurement error in the construction of Q variable[21] (e.g., Erickson and Whited (2000), Gomes (2001), Alti (2003), Moyen (2004), Chen and Chen (2012)).

Given our previous results, and per hypothesis 2, we predict a significant and positive relation between cash holdings and cash flow for treatment firms following the

[21] For instance, as argued by Gomes (2001), the financial constraints status should be included in the market value of the firm and should also be captured by Q. Therefore, the collinearity between cash flow and Q suggests that any sizable measurement error in the construction of Q can reduce the overall correlation between Q and investment and augment the correlation between investment and cash flow.

cross-delisting. To test this hypothesis, we re-estimate equation (1) replacing the dependent variable by cash holdings, measured as cash and marketable securities scaled by lagged total assets.

[Insert Table 9 here]

Table 9 shows the results of our estimations. Consistent with hypothesis 2, we find that the firms in the treatment group exhibit a higher propensity to save cash out of cash flows post-cross-delisting as the coefficient β_4 ($CF_{i,t} \times Treat_i \times Delist_{i,t}$) is positive and significant in all regression models. Taking model (1) as an example, a standard deviation increase in $Cash\ Flow$ (0.17 – Panel A of Table 2) represents an increase of 0.004 in cash prior to the cross-delisting that represents a 1.8% increase[22]. Following cross-delisting, the increase in cash associated with a one-standard deviation increase in $Cash\ Flow$ is 0.0302, which corresponds to a 13.7% increase[23]. The results are qualitatively identical when we use matched and non-matched control samples of cross-listed and never-cross-listed firms and different combinations of year, country, industry, and firm fixed-effects and clustered standard errors by country and year. Altogether, this evidence suggests that cross-delisted firms save more cash out of cash flows surrounding and after cross-delisting, which can be interpreted as a sign of these firms facing higher financial constraints following the cross-delisting event.

As an additional test of hypothesis 2, we follow Almeida, Campello and Weisbach (2004) and use an alternative approach in which a firms' decision to change its cash holdings is modeled as a function of a number of sources and uses of cash, such as capital expenditures, net acquisitions, changes in noncash net working capital, and changes in short-term debt. Hence, we estimate the following equation:

$$\begin{aligned} CASH_{i,t} = {} & \alpha_i + \beta_1 CF_{i,t} + \beta_2 Treat_i + \beta_3 Delist_{i,t} + \beta_4 CF_{i,t} \times Treat_i \times Delist_{i,t} + \beta_5 CF_{i,t} \times \\ & Treat_i + \beta_6 CF_{i,t} \times Delist_{i,t} + \beta_7 Delist_{i,t} \times Treat_i + \gamma_1 Q_{i,t-1} + \gamma_2 SIZE_{i,t-1} + \\ & \gamma_3 Expenditures_{i,t} + \gamma_4 Acquisitions_{i,t} + \gamma_5 \Delta NWC_{i,t} + \gamma_6 STD_{i,t} + \lambda_k + \eta_j + \\ & \gamma_t + \varepsilon_{i,t} \end{aligned} \quad (4)$$

[22] The sum of coefficients is (-0.0087+0.0321) x 0.17=0.004. The mean of cash variable is 0.22 (from Panel A of Table 2). Therefore, a 0.004 increase is equivalent to a 1.8% (0.004/0.22) increase.

[23] The sum of coefficients is (-0.0087+0.0321+0.1540) x 0.17=0.0302. Thus, a 0.0302 increase is equivalent to a 13.7% (0.0302/0.22) increase.

where $CASH_{i,t}$ is the ratio of cash and marketable securities scaled by lagged total assets of firm i in year t. $CF_{i,t}$ is the net income plus depreciation and amortization expenses scaled by lagged total assets. $Treat_i$ is an indicator variable equal to one if firm i is included in our treatment group, and zero otherwise. $Delist_{i,t}$ is an indicator variable equal to one if treatment firm i is delisted in year t, and zero otherwise. $Q_{i,t-1}$ is the market value of equity plus the book value of assets minus the book value of equity scaled by the book value of total assets. $SIZE_{i,t-1}$ is the logarithm of total assets. $Expenditures_{i,t}$ is capital expenditures scaled by lagged total assets. $Acquisitions_{i,t}$ is net assets from corporate acquisitions scaled by lagged total assets. $\Delta NWC_{i,t}$ is the change in non-cash net working capital scaled by lagged total assets. $STD_{i,t}$ corresponds to the change in short-term debt scaled by lagged total assets. Again, in our main regressions we also control for country, industry and year fixed effects and cluster standard errors by firm and year. Table 10 reports the results of estimations of equation (4).

[Insert Table 10 here]

Overall, the sign and magnitude of our main coefficient of interest, β_4, does not differ from the results in Table 9. We can conclude that, on average, delisted firms save more of cash out of cash flows than the firms in the control groups. The coefficients of *Expenditures* and *Acquisitions* are negative in (almost) all regressions. This can be explained by the fact that, at some point in time, firms must pay for those investment activities. The coefficients on *ΔNWC* are not significant and on *ΔSTD* display significant and positive estimatives, which is consistent with the argument that changes in short-term debt could be a substitute for cash (Almeida, Campello and Weisbach (2004)).

In addition, we replicate previous tests of investment-to-cash flow sensitivity analisys using equation (4), aiming to provide further support to hypothesis 2. Table 11 reports the results.

[Insert Table 11 here]

In Panel A of Table 11 we replicate tests of Table 6 and estimate equation (4), using the subsample of voluntary cross-delistings by groups of pre- and post-Rule 12h-6, ranking firms in high (low) group according to the legal origin (e.g., La Porta, Lopez-De-Silanes and Shleifer (2008)). Again, the coefficient β_4 is significant and positive

across estimations, except for models (4) and (5) using the high (Common Law) subgroup. The increase in cash-to-cash flow sensitivity post-cross-delisting is stronger for firms from low (Civil Law) group both in the pre- and in the post-Rule 12h-6.

Moreover, we also replicate tests of Table 8, using a matched sample of treatment and control group of cross-listed firms based on industry, country, year and on two alternate financial constraints criteria, *Payout Ratio* and *Rating*. As shown in Panel B of Table 11, the results are very similar to what we find in our previous tests; we still find a positive and statistically significant β_4.

Overall, these results give further support to hypothesis 2.

4.3 Investment Sensitivity to Information Content of Stock Prices around and Following Cross-Delisting from U.S. Exchange Markets

Our results so far show an increase in investment and cash sensitivities to cash flow following cross-delisting. We now test the impact of cross-delisting on the information content impounded into stock prices. Per the "bonding" hypothesis, a U.S. cross-listing is associated with a significant improvement in a firm's informational environment. Not only because foreign firms have to commit to higher standards of information disclosure, but also because cross-listing in the U.S. attracts more analysts coverage (e.g., Lang, Lins and Miller (2003), Bailey, Karolyi and Salva (2006)). If this is so, we should expect that cross-delisting produces the opposite effects, i.e., a deterioration of the firm's information environment and consequent increase in information asymmetries. Indeed, this effect may partially explain the evidence we found so far that post-cross-delisting firms become more financially constrained – a deterioration in the firm's information environment raises the cost of external financing and stresses the firm's financial constraints resulting in an increased sensitivity of investment and cash-to-cash flow. A way to determine the quality of the information environment is to test how informative stock prices are for managers to make their investment decisions. If the information content impounded into stock prices is high, then stock prices are more informative and help managers to make better investment decisions. Empirically, if stock prices become more informative to managers, we should observe a higher

sensitivity of investment to stock prices (Bond, Edmans and Goldstein, 2012; Foucault and Frésard, 2012). Thus, firms that suffer larger adverse information shocks should observe a decrease in their investment-to-price sensitivity. In our hypothesis 3, we posit that firms that are more severely affected by a negative shock to their information environment post-cross-delisting should have a reduction in their investment-to-price sensitivity.

We use two proxies of information asymmetry to capture negative information shocks suffered by firms after their cross-delisting. Our first measure of information asymmetry, as in Brennan and Subrahmanyam (1996), is the bid-ask spread – the difference between ask and bid prices, calculated as the annual median of the daily difference between ask and bid prices, and scaled by the mean of ask and bid prices. Our second proxy for information asymmetry is the change in R&D expenses; the rationale for using this measure is that the presence of intangible assets are positively correlated with information asymmetry due to economic uncertainty relating to intangibles (Barth and Kasznik, 1999; Aboody and Lev, 2000; Barth, Kasznik and McNichols, 2001, Loureiro and Taboada, 2015).

To test our hypothesis 3 we follow Loureiro and Taboada (2015) and compute changes, on an annual basis, for our two measures of information asymmetry, bid-ask spread and R&D expenses. Then, we compute changes on these measures around the cross-delisting year (*t*), from years *t-1 to t+1* and *t-2 to t+3*. Based on these changes, we create a dummy variable ($INF_{i,t}$) that is one for firms with values above median, and zero otherwise. Thus, when $INF_{i,t}$ is one, it means that the firm suffered an adverse information shock. We estimate the following equation considering only the treatment group:

$$I_{i,t} = \alpha_i + \beta_1 Q_{i,t-1} + \beta_2 Delist_{i.t} + \beta_3 INF_{i,t} + \beta_4 Q_{i,t-1} \times Delist_{i,t} \times INF_{i,t} + \beta_5 Q_{it-1} \times Delist_{i,t} + \beta_6 Q_{it-1} \times INF_{i,t} + \beta_7 Delist_{i,t} \times INF_{i,t} + \gamma_1 CF_{i,t} + \gamma_2 SIZE_{i,t-1} + \lambda_k + \eta_j + \gamma_t + \varepsilon_{i,t} \quad (5)$$

where $I_{i,t}$ is measured as the ratio of capital expenditures scaled by lagged PPE. $Q_{i,t-1}$ is the market value of equity plus the book value of assets minus the book value of equity scaled by the book value of total assets. $Delist_{i,t}$ is an indicator variable equal to one if treatment firm *i* is delisted in year *t*, and zero otherwise. $INF_{i,t}$ is defined as

before. $CF_{i,t}$ is the net income plus depreciation and amortization expenses scaled by lagged total assets. $SIZE_{i,t-1}$ is the logarithm of total assets. We expect that firms that suffered a more severe information shock (*INF=1*) post-cross-delisting, observe a decrease in the quality of the information content impounded into their stock prices, i.e., a lower investment-to-price sensitivity. Hence, we expect a negative coefficient of our main variable of interest $\beta_4(Q_{i,t-1} \times Delist_{i,t} \times INF_{i,t})$. Table 12 shows the results.

[Insert Table 12 here]

In models (1) and (2) of Table 12 we measure the information shock using changes in bid-ask spreads, and in models (3) and (4) we use changes in R&D. The results show a negative and statistically significant coefficient β_4, which means that the information content of stock prices decreases following the cross-delisting event for firms that suffered a greater deterioration in their information environment. The economic magnitude of coefficient β_4 is larger in the models (1) and (3) that capture changes in information asymmetry between *t-1 to t+1* relative to the cross-delisting event in year *t.* Taking model (1) as an example, for the average treatment firm, a one-standard-deviation increase in Q (1.50, for the treatment group) represents an increase of 0.12 in investment prior to cross-delisting or a 41.2% increase[24]. In contrast, in the post-cross-delisting the increase in investment associated with a one-standard-deviation increase in Q is -0.018, which corresponds to a decrease of 6.2%[25].

In our final tests, we explore cross-country variations of the impact of cross-delisting on the quality of firm's information environment, depending on whether they are from countries with stronger or weaker shareholder protection. According to Bailey, Karolyi and Salva (2006), the ("bonding") benefits from cross-listing on a U.S. exchange are more pronounced for firms from countries in which information disclosure requirements are lower. If this is the case, cross-delisted firms from countries with higher standards of financial disclosure should experience no change in investment-to-price sensitivity after cross-delisting. McLean, Zhang and Zhao (2012) document that investor protection is positively associated with stock price sensitivity; firms from

[24] The sum of coefficients is (0.0650+0.0147) x 1.50=0.12. The mean of investment for the treatment group is 0.29. Thus, a 0.12 increase is equivalent to a 41.2% (0.12/0.29) increase.

[25] The sum of coefficients is (0.0650+-0.1246+0.0329+0.0147) x 1.50=-0.018. Thus, a 0.018 decrease is equivalent to a 6.2% (-0.018/0.29) decrease.

countries with poor information disclosure requirements and poor shareholder protection may benefit the most from an improvement in the information environment and reach higher standards of corporate governance. Such improvements can mitigate agency problems and encourage investors to gather private information and, by trading, make stock prices more informative (Fernandes and Ferreira, 2008).

We then analyze whether firms from countries with higher governance standards and more developed capital markets are less penalized in the quality of their stock price informativeness post-cross-delisting conditional on having an adverse information shock. We use the *Disclosure* requirements index proposed by La Porta, Lopez-De-Silanes and Shleifer (2006) as a proxy for the quality of information environment at the country-level, and the stock market capitalization scaled by Gross Domestic Product (GDP) as a proxy for capital markets development. We then assign each firm to high (low) levels of each measure if the firm is from a country with above (below) the median value. We re-estimate equation (5) for each group and show the results in Table 13.

[Insert Table 13 here]

The results show a more negative and statistically significant coefficient β_4 for firm from countries with weaker disclosure requirements (low Disclosure) and less developed capital markets (low stock market capitalization-to-GDP). This means that mainly firms from these countries suffer an effective deterioration in the information quality of their stock prices as a consequence of a negative information shock post-cross-delisting. In contrast, the coefficient β_4 is only statistically significant in models (3) and (5) for firms from countries with higher disclosure standards and developed financial markets However, the magnitude of the coefficient β_4 in model (3) is about half of the size of the coefficient in model (4) – low market capitalization to GDP – and, more importantly, the *z*-test for the equality of β_4 between models (3) and (4) is statistically different from zero, meaning that the documented negative impact on stock price quality is indeed significantly stronger for countries from less developed markets. Also the coefficient β_4 of model (5) - high Disclosure – is of small magnitude than coefficient in model (6). Again, coefficients in both models are statistically different; the *z*-test for the equality of β_4 between models (5) and (6) is statistically different from zero.

In sum, we find support for our hypothesis 3 and conclude that firms that observe a greater increase in information asymmetry post-cross-delisting effectively suffer a greater reduction in the information quality of their stock prices with real consequences on investment decisions. Lower stock price informativeness leads to higher costs of external financing, increasing firm's financial constraints. Therefore, this evidence reveals a potential mechanism – the deterioration of the information environment – to explain our prior results that post-cross-delisting firms become more financially constrained. This conclusion is consistent with the idea of foreign firms losing the "bonding" benefits when they cross-delist from a U.S. exchange.

5. MAIN CONCLUSIONS

In this study we provide new evidence about the real economic effects of cross-delisting from U.S. stock exchanges on firms' financial constraints and investment sensitivities. We use cross-delistings as a quasi-experiment and employ a difference-in-differences methodology to test our main hypotheses that post-cross-delisting firms become more financially constrained and their information deteriorates. Our sample consists of 583 firms from 38 countries that cross-delisted from a U.S. exchange (treatment firms), 564 cross-listed control firms, and 10,397 never-cross-listed control firms, over the period of 2000-2012. We document an increase in investment- and cash-to-cash flow sensitivities following a cross-delisting from U.S. exchange markets for our group of treatment firms compared to each of the control groups of cross-listed or never-cross-listed firms. This result is quite persistent and does not depend on whether the cross-delisting was voluntary or involuntary; it does not depend also on whether the cross-delisting occurred before or after the Rule 12h-6 of 2007, which that made deregistrations and cross-delistings easier and less costly. This evidence supports our argument that post-cross-delisting firms become more financially constrained. We also show that this effect is stronger for firms from Civil Law countries; thus, keeping all else equal, firms that face weaker domestic shareholder protection seem to lose more after cross-delisting from U.S. stock exchanges.

As the increase in financial constraints may, in part, be related to a deterioration in firm's information environment post-cross-delisting, we further investigate whether stock prices become less informative for managers following the cross-delisting. We

find that investment-to-price sensitivity decreases after cross-delisting for firms that increased their information asymmetry (higher bid-ask spreads or R&D expenses) around the delisting event. This finding might help to explain the increasing sensitivity of investment to internal funds; cross-delisted firms face higher financial constraints, which can be partially driven by asymmetry deterioration in their information environment and in turn enhances the firms' cost of capital.

Overall, our findings are consistent with the "bonding" hypothesis; if foreign firms are able to improve their information environment after cross-listing on a U.S. exchange market, especially when those firms come from countries with poor shareholder protection and less developed financial markets, then we expect to find the opposite effect when they leave the U.S. markets. Our study provides evidence that this is the case and that there are adverse real economic consequences that affect firms' investment decisions.

REFERENCES

ABOODY, D. and LEV, B. (2000) Information asymmetry, R&D, and insider gains. *The Journal of Finance.* 55 (6). p. 2747–2766.

ALMEIDA, H., CAMPELLO, M. and WEISBACH, M. (2004) The cash flow sensitivity of cash. *The Journal of Finance.* 59 (4). p. 1777-1804.

ALTI, A. (2003) How sensitive is investment to cash flow when financing is frictionless? *The Journal of Finance*. 58 (2). p. 707-722.

BAILEY, W., KAROLYI, G. and SALVA, C. (2006) The economic consequences of increased disclosure: Evidence from international cross-listings. *Journal of Financial Economics*. 81 (1). p. 175–213.

BARTH, M. and KASZNIK, R. (1999) Share repurchases and intangible assets. *Journal of Accounting and Economics.* 28 (2). p. 211-241.

BARTH, M., KASZNIK, R. and McNICHOLS, M. (2001) Analyst coverage and intangible assets. *Journal of Accounting Research.* 39 (1). p. 1-34.

BOND, P., EDMANS, A. and GOLDSTEIN, I. (2012) The real effects of financial markets. *Annual Review of Financial Economics*. 4. p. 339-360.

BRENNAN, M. and SUBRAHMANYAM, A. (1996) Market microstructure and asset pricing: On the compensation for illiquidity in stock returns. *Journal of Financial Economics.* 41 (3). p. 441-464.

CHANG, H. and SONG, F. (2013) Testing the pecking order theory with financial contraints. Available at *SSRN Electronic Journal January 2013, DOI: 10.2139/ssrn.2200847.*

CHAPLINSKY, S. and RAMCHAND, L. (2012) What drives delistings of foreign firms from U.S. Exchanges? *Journal of International Financial Markets, Institutions and Money*. 22 (5). p. 1126– 1148.

CHEN, H. and CHEN, S. (2012) Investment-cash flow sensitivity cannot be a good measure of financial constraints: Evidence from the time series. *Journal of Financial Economics*. 103 (2). p. 393-410.

CHEN, Q., GOLDSTEIN, I. and JIANG, W. (2007) Price informativeness and investment sensitivity to stock price. *The Review of Financial Studies.* 20 (3). p. 619–650.

COFFEE, J. (1999) The future as history: the prospects for global convergence in corporate governance and its implications. *Northwestern University Law Review*. 93 (3). p. 641–708.

COFFEE, J. (2002) Racing towards the top? The impact of cross-listing and stock market competition on international corporate governance. *University of Pennsylvania Law Review*. 102 (7). p. 1757–1831.

COFFEE, J. (2007) Law and the market: the impact of enforcement. *Columbia Law Rev*iew. 156 (2). p. 229–311.

DJANKOV, S., La PORTA, R., LOPEZ-De-SILANES, F. and SHLEIFER, A. (2008) The law and economics of self-dealing. *Journal of Financial Economics*. 88 (3). p. 430–465.

DOIDGE, C., KAROLYI, A. and STULZ, R. (2010) Why do foreign firms leave U.S. equity markets? *The Journal of Finance*. 65 (4). p. 1507-1553.

DURNEV, A., MORCK, R. and YEUNG, B. (2004) Value-enhancing capital budgeting and firm-specific stock return variation. *The Journal of Finance.* 59 (1). p. 65-105.

ERICKSON, T. and WHITED, T. (2000) Measurement error and the relationship between investment and *q*. *Journal of Political Economy*. 108 (5). p. 1027-1057.

ERRUNZA, V. and MILLER, D.P. (2000) Market segmentation and the cost of capital in international markets. *Journal of Financial and Quantitative Analysis*. 35 (4). p. 577-600.

FAMA, E. and FRENCH, K. (1997) Industry costs of equity. *Journal of Financial Economics*. 43 (2). p. 153-193.

FAZZARI, S., HUBBARD, R. and PETERSEN, B. (1988) financing constraints and corporate investment. *Brookings Papers on Economic Activity*. 1. p. 141-206.

FERNANDES, N. and FERREIRA, M. (2008) Does international cross-listing improve the information environment? *Journal of Financial Economics*. 88 (2). p. 216–244.

FERNANDES, N., LEL, U. and MILLER, D. (2010) Escape from New York: The market impact of loosening disclosure requirements. *Journal of Financial Economics.* 95 (2). p. 129–147.

FOUCAULT, T. and FRÉSARD, L. (2012) Cross-listing, investment sensitivity to stock price and the learning hypothesis. *The Review of Financial Studies*. 25. p. 3305-3350.

FRANK, M. and GOYAL, V. (2003) Testing the pecking order theory of capital structure. *Journal of Financial Economics*. 67. p. 217–248.

GILCHRIST, S. and HIMMELBERG, C. (1995) Evidence on the role of cash flow for investment. *Journal of Monetary Economics*. 36 (3). p. 541–572.

GOMES, J. (2001) Financing investment. *American Economic Review*. 91. p. 1263–85.

HAIL, L. and LEUZ, C. (2009) Cost of capital effects and changes in growth expectations around U.S. cross-listings. *Journal of Financial Economics*. 93 (3). p. 428–454.

HAIL, L., TAHOUN, A. and WANG, C. (2014) Dividend payouts and information shocks. *Journal of Accounting Research.* 52 (2). p. 403-456.

HOSTAK, P., LYS, T., YANG, Y. and CARR, E. (2013) An examination of the impact of the Sarbanes-Oxley Act on the attractiveness of U.S. capital markets for foreign firms. *Journal of Accounting Studi*es. 18 (2). p. 522-559.

KAPLAN, S. and ZINGALES, L. (1997) Do investment-cash flow sensitivities provide useful measures of financing constraints. *Quarterly Journal of Economics*. 112 (1). p. 169–215.

KAROLYI, G. (2012) Corporate governance, agency problems and international cross-listings: A defense of the bonding hypothesis. *Emerging Markets Review*. 13 (4). p. 516-547.

KASHYAP, A., LAMONT, O. and STEIN, J. (1994) Credit Conditions and the Cyclical Behavior of Inventories. *Quarterly Journal of Economics*. 109. p. 565–592.

KUMAR, P. and RAMCHAND, L. (2008) Takeovers, market monitoring and international corporate governance. *The Rand Journal of Economics*. 39 (3). p. 850-874.

La PORTA, R., LOPEZ-De-SILANES, F. and SHLEIFER, A. (2006) What works in securities laws? *The Journal of Finance.* 61 (1). p. 1-32.

La PORTA, R., LOPEZ-De-SILANES, F. and SHLEIFER, A. (2008) The Economic Consequences of Legal Origins. *Journal of Economic Literature*. 46 (2). p. 285-332.

La PORTA, R., LOPEZ-De-SILANES F., SHLEIFER, A. and VISHNY, R. (1997) Legal determinants of external finance. *The Journal of Finance*. 52 (3). p. 1131-1150.

La PORTA, R., LOPEZ-De-SILANES, F., SHLEIFER, A. and VISHNY, R. (1998) Law and finance, *Journal of Political Economy*. 106 (6). p. 1113–1155.

LAMONT, O., POLK, C. and SAÁ-REQUEJO, J. (2001) Financial constraints and stock returns. *The Review of Financial Studies*. 14 (2). p. 529-554.

LANG, M., LINS, K. and MILLER, D. (2003) ADRs, analysts and accuracy: does cross-listing in the U.S. improve a firm's information environment and increase market value? *Journal of Accounting Research.* 41 (2). p. 317–345.

LEMMON, M. and ZENDER, J. (2010) Debt capacity and tests of capital structure theories. *Journal of Financial and Quantitative Analysis.* 45 (5). p. 1161-1187.

LINS, K., STRICKLAND, D. and ZENNER, M. (2005) Do non-U.S. firms issue equity on U.S. exchanges to relax capital constraints? *Journal of Financial and Quantitative Analysis*. 40 (1). p. 109–133.

LOUREIRO, G. and TABOADA, A. (2015) Do improvements in the information environment enhance insiders' ability to learn from outsiders? *Journal of Accounting Research*. 53 (4). p. 863-905.

MAROSI, A. and MASSOUD, N. (2008) You can enter, but you cannot leave . . .— U.S. securities markets and foreign firms. *The Journal of Finance.* 63 (5). p. 2477–2506.

McLEAN, R., ZHANG, T. and ZHAO, M. (2012) Why does the law matter? Investor protection and its effects on investment, finance, and growth. *The Journal of Finance.* 67 (1). p. 313-350.

MOYEN, N. (2004) Investment-cash flow sensitivities: constrained versus unconstrained firms. *The Journal of Finance*. 59 (5). p. 2061–2092.

OHLSON, J. (1980) Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research.* 18 (1). p. 109–131.

REESE, W. and WEISBACH, M. (2002). Protection of minority shareholder interests, cross-listings in the United States, and subsequent equity offerings. *Journal of Financial Economics*. 66 (1). p. 65–104.

ROSENBAUM, P. and RUBIN, D. (1983) The central role of the propensity score in observational studies for causal effects. *Biometrika*. 70 (1). p. 41–55.

SHYAM-SUNDER, L. and MYERS, S. (1999) Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics.* 51. p. 219–244.

STULZ, R. (1999) Globalization, corporate finance, and the cost of capital. *Journal of Applied Corporate Finance*. 12 (3). p. 8–25.

WANG, Y., CAI, H., LI, C., JIANG, Z., WANG, L., SONG, J. and XIA, J. (2013) Optimal caliper width for propensity score matching of three treatment groups: A Monte Carlo Study. PLoS ONE 8(12): e81045. *doi:10.1371/journal.pone.0081045.*

WHITED, T. (1992) Debt, liquidity constraints and corporate investment: evidence from panel data. *The Journal of Finance*. 47 (4). p. 1425–1460.

WHITED, T. and WU, G. (2006) Financial constraints risk. *The Review of Financial Studies.* 19 (2). p. 531-559.

Appendix A - Definitions and Sources of the variables

VARIABLE	DEFINITION	SOURCE
Firm-level		
Acquisitions	Net assets from acquisitions divided by lagged total assets.	Worldscope
AGE	Logarithm of the number of years since firms appeared for the first time in Database.	Datastream
Assets Growth	Percentage change in total assets over a one-year period.	Worldscope
Bid-Ask spread	Yearly median of the daily difference between ask and bid prices, scaled by the midpoint.	Datastream
Bond Rating	Bond rating from the Standard and Poor's agency.	SDC and Datastream
Capex-to-TA	Capital expenditures (CAPEX) divided by lagged total assets (TA) minus cash and short-term investments.	Worldscope
Cash Flow	Net income plus depreciation and amortization expenses divided by lagged total assets.	Worldscope
Cash Holdings	Cash and marketable securities divided by lagged total assets.	Worldscope
Delist	Dummy variable that equals one if a firm is delisted from U.S. exchange markets (NYSE or NASDAQ) in a given year, and zero otherwise.	SEC website, Datastream and Citibank
Expenditures	Capital expenditures scaled by lagged total assets.	Worldscope
Financing Deficit	Numerator: the sum of cash dividends, net investments, and net changes in working capital, less internal cash flows (net income, depreciation and amortization expenses, and deferred taxes). Denominator: lagged total assets (see Frank and Goyal, 2003). Deferred taxes are set to zero when they are missing.	Worldscope
Fixed Assets ratio	Property, Plant and Equipment (PPE) divided by total assets.	Worldscope
Investment	Capital expenditures (CAPEX) divided by lagged property, plant and equipment (PPE).	Worldscope
Leverage ratio	Total debt (short-term plus long-term debt) divided by total assets.	Worldscope
Market capitalization	Market price (year-end) multiplied by the number of common shares outstanding, denominated in U.S. dollars and converted at fiscal year-end exchange rates.	Datastream
O-Score	$O=1.3-0.4X_1+6.0X_2-1.4X_3+0.8X_4-2.4X_5-1.8X_6+0.3X_7-1.7X_8-0.5X_9$ X_1=log(total assets); X_2=total liabilities-to-total assets; X_3=net working capital-to-total assets; X_4=current liabilities-to-current assets;X_5=1 (if total liabilities exceeds total assets) or 0 otherwise;X_6=net income-to-total assets;X_7=cash flow from operations-to-total liabilities;X_8=1 (if net income was negative for the last two years) or 0 otherwise; X_9=changes in net income scaled by the net income for the last 2 years.	Ohlson (1980)

VARIABLE	DEFINITION	SOURCE
R&D	Changes in research and development (R&D) expenses. R&D is set to zero when it is missing.	Worldscope
Rating	Probability of a firms' debt being rated predicted by a logistic model proposed by Lemmon and Zender (2010).	Worldscope
Return on Assets (ROA)	Earnings before interest and taxes (EBIT) divided by total assets.	Worldscope
Sales Growth	Sales growth is measured as the percentage change in sales over year *t-1* to *t*	Worldscope
SIZE	Logarithm of total assets.	Worldscope
Standard deviation stock returns	Yearly standard deviation of firm-specific weekly returns.	Datastream
(Tobin's) *Q*	Numerator: market value of equity plus book value of assets minus book value of equity. Denominator: book value of assets.	Worldscope
Total Assets (TA)	Total Assets in U.S. dollars, converted at fiscal year-end exchange rates.	Worldscope
Treat	Dummy variable that equals 1 if a firm is included in the treatment group or 0 otherwise.	SEC website, Datastream and Citibank
ΔNet Working capital (ΔNWC)	Current assets excluding cash and marketable securities divided by current liabilities. Changes in NWC is scaled by lagged total assets.	Worldscope
ΔShort-Term Debt (ΔSTD)	Changes in short-term debt scaled by lagged total assets.	Worldscope
Industry-Level		
INDUSTRY	Classification according Fama and French 48 Industry Codes.	Fama and French (1997)
SIC CODE	4-digit Standard Industrial Classification (SIC) Code.	Datastream
Country-Level		
Legal Origin	Indicator variable that equals one for Common Law (Civil Law) countries and zero otherwise.	La Porta, Lopez-De-Silanes and Shleifer (2008)
Market cap-to-GDP	Market capitalization divided by Gross domestic product (GDP).	World Bank

Appendix B – Measures of Financial Constraints

I. PAYOUT RATIO

Following Almeida, Campello and Weisbach (2004), the *Payout ratio* is the ratio of cash dividends plus repurchases of common and preferred stock[26] to operating income, thus we have: *Payout ratio* = (Cash Dividends + Repurchases) / Operating Income

II. KZ INDEX

The KZ INDEX is calculated adopting Lamont, Polk and Saá-Requejo (2001) method:

$$KZ = -1.001909CF_{i,t} + 0.2826389Q_{i,t} + 3.139193DEBT_{i,t} - 39.36780TDIV_{i,t} - 1.314759CASH_{i,t}$$

where, $CF_{i,t}$ is Cash Flow (income before extraordinary items plus depreciation and amortization expenses) divided by lagged PPE; $Q_{i,t}$ is measured as total liabilities plus market value of equity plus preferred stock[27] minus deferred taxes divided by the total capital (sum of long- and short-term debt plus total shareholders' equity); $DEBT_{i,t}$ is the sum of total long- and short-term debt divided total capital; $TDIV_{i,t}$ is the sum of cash dividends of common and preferred dividends divided by lagged PPE; $CASH_{i,t}$ is cash and short-term investments divided by lagged PPE.

III. WW INDEX

$$WW = 0.091CF_{i,t} + 0.021TLTA_{i,t} - 0.062DIVPOS_{i,t} - 0.044LNTA_{i,t} + 0.102ISG_{i,t} + 0.035SG_{i,t}$$

where, $CF_{i,t}$ is Cash Flow (income before extraordinary items plus depreciation and amortization expenses) divided by total assets; $TLTA_{i,t}$ is the sum of total long- and short-term debt divided by divided by total assets; $DIVPOS_{i,t}$ is a dummy variable that takes one if the firm pays dividends and zero otherwise; $LNTA_{i,t}$ is the logarithm of total assets; $ISG_{i,t}$ is the firm's 3-digit industry sales growth; $SG_{i,t}$ is the annual percentage change in sales.

[26] Repurchases of common and preferred stock are set to zero when they are missing.

[27] Preferred stock is set to zero when it is missing.

TABLE 1: Sample Description by Country

Table 1 describes the number of firms ("No. Firms") and the total number observations ("Obs.") for the full sample of cross-listings, and for cross-delisted and control firms by country of origin. We exclude financial firms (SIC Code 6000-6999) and strictly regulated firms (SIC Code 4900-4949). *Exchange* consists of all firms that have been listed on U.S. exchange markets over 2000-2012. *Treatment* is the subsample of firms in our sample that have cross-delisted at some point in time between 2000 and 2012. "Pre" and "Post" are the corresponding number of observations for the treatment firms before and after the cross-delisting event. *Control* includes two control groups: 1) control group of firms that remained listed over the sample period; 2) control group of never-cross-listed firms. *Denotes a country designated as an emerging market by Standard and Poor's Emerging Market Database.

	Full Sample (Exchange)		Treatment			Control			
						Cross-listed		Never-cross-listed	
	No. Firms	Obs.	No. Firms	Obs. **Pre**	Obs. **Post**	No. Firms	Obs.	No. Firms	Obs.
Argentina*	7	71	2	11	1	5	60	27	249
Australia	26	138	19	81	40	7	57	83	581
Austria	1	6	1	6	6	0	0	47	538
Belgium	4	26	2	12	1	2	14	44	489
Brazil*	30	295	13	93	16	17	202	42	506
Canada	353	2,188	194	869	200	159	1,319	178	1,571
Chile*	14	129	9	54	31	5	75	80	836
China*	131	592	23	77	2	108	515	1,724	11,727
Colombia*	1	5	0	0	0	1	5	22	189
Denmark	4	39	2	14	8	2	25	59	732
Finland	7	40	6	27	19	1	13	72	902
France	32	236	23	131	83	9	105	340	3,592
Germany	25	147	20	88	86	5	59	201	1,573
Greece	30	167	6	25	3	24	142	137	1,052
Hong Kong	38	253	20	102	33	18	151	684	5,710
Hungary	1	12	1	12	3	0	0	18	167
India*	13	112	4	26	13	9	86	989	6,563
Indonesia*	2	30	0	0	0	2	30	277	2,571
Ireland	17	128	9	39	16	8	89	10	53
Israel	91	704	38	191	71	53	513	84	606
Italy	11	109	6	42	22	5	67	95	923
Japan	24	272	9	71	30	15	201	1,021	11,193
Korea*	12	88	7	28	12	5	60	1,161	9,819
Luxembourg	13	86	8	56	29	5	30	8	53
Mexico*	33	302	16	101	73	17	201	51	555
Netherlands	37	246	26	142	68	11	104	68	661
New Zealand	4	24	3	11	24	1	13	44	364
Norway	15	111	7	47	22	8	64	91	694
Peru*	2	22	1	9	6	1	13	68	635
Philippines*	2	20	1	7	0	1	13	67	632
Poland*	1	2	1	2	11	0	0	192	1,284
Portugal	1	13	0	0	0	1	13	41	444
Russia*	7	58	4	37	12	3	21	163	689
Singapore	6	54	4	30	13	2	24	463	3,924
South Africa*	9	92	3	16	18	6	76	135	1,219
Spain	7	46	4	28	2	3	18	57	649
Sweden	14	74	13	61	63	1	13	171	1,467
Switzerland	12	106	7	42	21	5	64	63	683
Taiwan	11	104	1	9	3	10	95	567	5,271
Turkey*	1	13	0	0	0	1	13	217	1,949
United Kingdom	94	666	66	338	148	28	328	522	4,529
Venezuela*	4	20	4	20	23	0	0	14	121
All Countries	**1,147**	**7,846**	**583**	**2,955**	**1,232**	**564**	**4,891**	**10,397**	**87,965**

TABLE 2: Summary Descriptive Statistics

Table 2 provides descriptive statistics for the full sample of treatment and control groups of cross-listed and never-cross-listed firms, between 2000 and 2012. *Total Assets* are in US$ million, reflecting 2000 prices. *Investment* is capital expenditures scaled by lagged PPE. *Cash Flow* is net income plus depreciation and amortization expenses scaled by lagged total assets. *Cash Holdings* is the ratio of cash and marketable securities scaled by lagged total assets. *Q* is measured as the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *Sales Growth* is the percentage change in sales over a one-year period. *ROA* is measured as earnings before interest and taxes scaled by total assets. *O-Score* is a measure of predictive financial distress proposed by Ohlson (1980). *Financing deficit* corresponds to the sum of dividends, net investments and net changes in working capital minus internal cash flows, scaled by lagged total assets (see Frank and Goyal, 2003). *Leverage* is the ratio of total debt to total assets. All variables are defined in Appendix A. Panel A shows the mean, median, standard deviation ("SD") and the number of observations ("N") for all our main variables. Panel B reports the differences in means and medians between cross-delisted firms and control groups of cross-listed and never-cross-listed firms. Differences in means are tested using *t*-statistic test (*t*-statistics in parentheses) and differences in medians are tested using Wilcoxon rank sum test (*z*-statistics in parentheses). ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

Panel A: Descriptive Statistics

									CONTROL							
Sample:	Full Sample				Treatment				Cross-listed				Never-cross-listed			
	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N
Total Assets	8,101.29	989.55	20,600.00	9,078	5,209.68	812.71	12,200.00	4,187	10,575.10	1,260.78	25,400.00	4,891	590.88	135.72	1,533.19	87,965
Investment	0.30	0.20	0.37	9,078	0.29	0.18	0.39	4,187	0.32	0.21	0.36	4,891	0.34	0.15	0.72	87,965
Cash Flow	0.06	0.08	0.17	9,078	0.04	0.07	0.18	4,187	0.08	0.10	0.16	4,891	0.07	0.07	0.11	87,965
Cash Holdings	0.22	0.13	0.25	9,078	0.21	0.12	0.25	4,187	0.23	0.15	0.25	4,891	0.16	0.11	0.17	87,965
Q	1.94	1.42	1.62	9,078	1.82	1.35	1.50	4,187	2.05	1.49	1.75	4,891	1.50	1.15	1.06	87,965
Sales Growth	0.08	0.07	0.47	9,078	0.05	0.05	0.45	4,187	0.10	0.09	0.48	4,891	0.07	0.07	0.32	87,965
ROA	0.04	0.06	0.17	9,078	0.02	0.05	0.18	4,187	0.06	0.07	0.16	4,891	0.07	0.06	0.12	87,965
O-Score	0.08	0.02	0.16	9,025	0.10	0.03	0.19	4,159	0.06	0.01	0.13	4,866	0.12	0.05	0.19	87,525
Financing Deficit	0.07	0.02	0.26	9,078	0.07	0.02	026	4,187	0.08	0.02	0.26	4,891	0.04	0.00	0.22	87,965
Leverage	0.23	0.21	0.20	9,078	0.25	0.24	0.21	4,187	0.21	0.18	0.19	4,891	0.23	0.21	0.19	87,965

Panel B - Univariate Comparisons between Treatment and Control Groups

Control Sample:	**Cross-listed firms**		**Never-cross-listed firms**	
	Differences in Means	*Differences in Medians*	*Differences in Means*	*Differences in Medians*
Total Assets	-5,365.42 ***	-448.06 ***	4,618.79 ***	676.99 ***
	(13.14)	(8.14)	(24.59)	(48.55)
Investment	-0.028 ***	-0.034 ***	-0.053 ***	0.028 ***
	(3.50)	(8.26)	(8.21)	(10.08)
Cash Flow	-0.043 ***	-0.025 ***	-0.036 ***	0.001 ***
	(11.97)	(12.26)	(12.94)	(5.56)
Cash Holdings	-0.026 ***	-0.030 ***	0.044 ***	0.005 ***
	(4.99)	(7.67)	(11.41)	(5.33)
Q	-0.242 ***	-0.140 ***	0.309 ***	0.194 ***
	(7.23)	(8.50)	(13.66)	(20.04)
Sales Growth	-0.056 ***	-0.038 ***	-0.025 ***	-0.022 ***
	(5.74)	(8.44)	(3.59)	(6.33)
ROA	-0.043 ***	-0.026 ***	-0.052 ***	-0.016 ***
	(11.95)	(12.40)	(18.39)	(15.99)
O-Score	0.043 ***	0.014 ***	-0.025 ***	-0.023 ***
	(12.34)	(17.12)	(8.22)	(20.95)
Financing Deficit	-0.008	-0.001	0.030 ***	0.015 ***
	(0.55)	(0.75)	(7.31)	(7.68)
Leverage	0.042 ***	0.064 ***	0.019 ***	0.031 ***
	(9.88)	(9.62)	(5.59)	(3.06)

TABLE 3: Summary Statistics of Investment and Cash holdings across financially constrained (unconstrained) firms

Table 3 shows summary statistics for *Investment* and *Cash holdings* for the groups of financially constrained ("C") and unconstrained ("U") firms, namely the mean, median, standard deviation ("SD") and the number of observations ("N"). *Investment* is capital expenditures scaled by lagged PPE. *Cash holdings* is the ratio of cash and marketable securities scaled by lagged total assets. *Payout ratio* is total distributions scaled by operating income, as described in Appendix B. Firms are ranked as financially constrained (unconstrained) those in the bottom (top) terciles of annual payout. *KZ index* proposed by Lamont, Polk and Saá-Requejo (2001) is described in Appendix B. Firms in the top (bottom) three deciles of the KZ index ranking are considered financially constrained (unconstrained). *WW index* proposed by Whited and Wu (2006) is described in detail in Appendix B. Firms in the top (bottom) terciles of the WW index are considered financially constrained (unconstrained). *SIZE* is the logarithm of total assets. *Rating* is estimated using the model proposed by Lemmon and Zender (2010) that predicts whether a firm has a bond rating in a given year. Financially constrained (unconstrained) in terms of *SIZE* and *Rating* are those in the bottom (top) terciles of the variables. Differences in means are tested using *t*-statistic test (*p*-value in parentheses) and differences in medians are tested using Wilcoxon rank sum test (*p*-value in parentheses). ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Investment=Capex-to-lagged PPE				Cash holdings=Cash-to-lagged TA			
	Mean	Median	SD	N	Mean	Median	SD	N
i) Payout Ratio								
Constrained (C)	0.34	0.19	0.46	2,929	0.29	0.19	0.30	2,929
Unconstrained (U)	0.24	0.19	0.25	2,841	0.15	0.10	0.16	2,841
(C)=(U) (p-value)	*(0.000)*	*(0.909)*			*(0.000)*	*(0.000)*		
ii) KZ Index								
Constrained (C)	0.21	0.14	0.27	2,723	0.10	0.07	0.11	2,723
Unconstrained (U)	0.46	0.29	0.50	2,723	0.40	0.32	0.32	2,723
(C)=(U) (p-Value)	*(0.000)*	*(0.000)*			*(0.000)*	*(0.000)*		
iii) WW Index								
Constrained (C)	0.31	0.21	0.36	2,372	0.24	0.16	0.24	2,372
Unconstrained (U)	0.30	0.20	0.39	2,372	0.21	0.12	0.26	2,372
(C)=(U) (p-Value)	*(0.401)*	*(0.000)*			*(0.063)*	*(0.000)*		
iv) SIZE								
Constrained (C)	0.40	0.23	0.50	2,572	0.36	0.29	0.32	2,572
Unconstrained (U)	0.22	0.19	0.17	2,853	0.12	0.09	0.11	2,853
(C)=(U) (p-Value)	*(0.000)*	*(0.000)*			*(0.000)*	*(0.000)*		
v) Rating								
Constrained (C)	0.30	0.17	0.40	2,495	0.22	0.14	0.25	2,495
Unconstrained (U)	0.26	0.20	0.24	2,498	0.16	0.10	0.19	2,498
(C)=(U) (p-Value)	*(0.000)*	*(0.000)*			*(0.000)*	*(0.000)*		

TABLE 4: Lemmon and Zender (2010) modified test for financing constraints

Table 4 shows regression estimates of equation (2) for the groups of financially constrained ("C") and unconstrained ("U") firms according to five criteria of financial contraints. *Payout ratio* is measured as total distributions scaled by operating income as described in Appendix B. Firms are ranked as financially constrained (unconstrained) those in the bottom (top) terciles of annual payout. *KZ* index proposed by Lamont, Polk and Saá-Requejo (2001) and is described in Appendix B. Firms in the top (bottom) terciles of the *KZ* index ranking are considered financially constrained (unconstrained). *WW* index proposed by Whited and Wu (2006) is described in detail in Appendix B. Firms in the top (bottom) terciles of the WW index ranking are considered financially constrained (unconstrained). *SIZE* is measured as logarithm of total assets. *Rating* is estimated using the model proposed by Lemmon and Zender (2010) that predicts whether a firm has a bond rating in a given year. Financially constrained (unconstrained) in terms of *SIZE* and *Rating* are those in the bottom (top) terciles of the variables. The dependent variable is changes in *Leverage*, which is measured as the percentage change in total debt over a one-year period. *Financing deficit* corresponds to the sum of dividends, net investments and net changes in working capital minus internal cash flows, scaled by lagged total assets (see Frank and Goyal, 2003). *Financing deficit*^{2} is the square of *Financing deficit*. All variables are defined in Appendix A. In all models standard errors are clustered by year- and firm-level. Regresssions include year, country and industry fixed effects. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: changes in leverage									
FC criterion:	**Payout Ratio**		**KZ Index**		**WW Index**		**SIZE**		**Rating**	
	C	U	C	U	C	U	C	U	C	U
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Financing deficit$_t$	0.2182	0.4955***	0.3184***	0.0847	0.1569	0.1455	0.1619	0.3966***	0.1029	0.7909***
	(1.38)	(3.39)	(4.76)	(0.54)	(1.10)	(1.08)	(0.83)	(4.64)	(0.98)	(4.88)
Financing deficit^2_t	-0.3784**	-0.3849**	-0.0050	-0.3485*	-0.0944	-0.2502**	-0.3582*	-0.2209***	-0.3291***	-0.6165**
	(-2.40)	(-2.10)	(-0.04)	(-1.72)	(-0.58)	(-2.19)	(-1.82)	(-2.59)	(-3.62)	(-2.45)
Constant	0.2739	0.0740	0.0744	-0.0743	0.0695	0.8791	1.3741***	0.1727***	-0.0844	1.1249***
	(0.85)	(0.58)	(0.32)	(-0.14)	(0.34)	(1.12)	(3.23)	(6.56)	(-0.43)	(7.18)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,087	2,577	2,565	1,830	1,989	1,968	1,496	2,839	2,050	2,297
R-squared	0.045	0.070	0.096	0.053	0.029	0.069	0.059	0.061	0.079	0.068

TABLE 5: Investment-to-cash flow sensitivity

Table 5 reports regression estimates of equation (1) using different specifications. The dependent variable is *Investment*, which is measured as capital expenditures scaled by lagged PPE. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *Treat* is a dummy variable equal to one for firms included in our treatment group, and zero otherwise. *Delist* $_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. All variables are defined in Appendix A. In Panel A, models (1)-(4) show results for the full sample using the primary control group of cross-listed firms. In model (4) we use a control matched sample of cross-listed firms. Firms are matched by country, year, industry, and *SIZE* using the PSM technique (nearest neighbor with replacement). Models (5) and (6) show results using the alternate control group of never-cross-listed firms. In all models, except for model (2), standard errors are clustered by firm and year; in model (2) standard errors are clustered by country and year. The *p*-value of Likelihood-ratio (LR) test is also reported (in parentheses). Panel B reports regression estimates of equation (1) using two alternate measures of corporate investment: i) capital expenditures scaled by lagged total assets minus cash and short-term investment; ii) assets growth, which is measured as the percentage change in total assets over a one-year period. Models (1) and (2) show results for the full sample using the primary control group of cross-listed firms. In Models (3) and (4) we use a control matched sample of cross-listed firms. Models (5)-(8) show results using the alternate control group of never-cross-listed firms; models (5) and (6) show results for the full sample and models (7) and (8) show results of a control matched sample of never-cross-listed firms. In all models standard errors are clustered by firm and year. Regressions include year, industry, and country, and firm fixed effects. The last two rows show the sum and the respectively *p*-value of the coefficients $[CF + CF \times Delist \times Treat + CF \times Treat]$. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

Panel A: Investment-to-cash flow sensitivity. Main Results

	Dependent variable: Capex-to-lagged PPE					
Control group:	Cross-listed				Never-cross-listed	
	Baseline	Country	Firm FE	Matched Sample	Baseline	Matched Sample
	(1)	(2)	(3)	(4)	(5)	(6)
CF_t	0.2366***	0.2327***	0.2935***	0.1430*	0.3959***	0.1773*
	(3.82)	(3.35)	(3.71)	(1.77)	(9.53)	(1.65)
$Treat_i$	-0.0020	-0.0020		0.0021	0.0878***	0.0351
	(-0.18)	(-0.21)		(0.13)	(5.17)	(1.51)
$Delist_t$	-0.0345**	-0.0470***	-0.0205	-0.0411**	-0.0536**	-0.0497*
	(-1.98)	(-3.11)	(-1.19)	(-2.10)	(-2.21)	(-1.71)
CF_t x $Delist_t$ x $Treat_i$	0.1979**	0.1757***	0.2428**	0.1908**	0.2263*	0.2173*
	(2.07)	(2.88)	(2.36)	(2.06)	(1.78)	(1.77)
CF_t x $Treat_i$	-0.1864**	-0.1713**	-0.1531	-0.0735	-0.2848***	-0.1305
	(-2.26)	(-2.56)	(-1.41)	(-0.54)	(-2.78)	(-0.85)
Q_{t-1}	0.0571***	0.0581***	0.0629***	0.0582***	0.0771***	0.0888***
	(10.57)	(10.25)	(10.28)	(8.00)	(16.20)	(8.94)
$SIZE_{t-1}$	-0.0338***	-0.0310***	-0.0600***	-0.0348***	-0.0667***	-0.0583***
	(-8.73)	(-6.34)	(-5.05)	(-10.08)	(-23.85)	(-8.52)
Constant	0.5523***	0.6661***	1.0373***	0.5710***	0.7394***	0.4855***
	(6.04)	(5.46)	(6.30)	(6.31)	(15.62)	(6.45)
Firm FE	No	No	Yes	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	Yes
Country FE	Yes	No	No	Yes	Yes	Yes
Observations\	9,078	9,078	9,078	5,376	92,152	6,642
R-squared	0.199	0.181	0.117	0.201	0.129	0.153
PROPENSITY SCORE						
LR chi^2 (*p* value)				(0.731)		(0.100)
$[CF + CF \times Delist \times Treat + CF \times Treat]$	0.2481***	0.2371***	0.3832***	0.2603**	0.3374**	0.2641*
p-value	(0.008)	(0.000)	(0.000)	(0.011)	(0.038)	(0.097)

Panel B: Investment-to-cash flow sensitivity. Robustness tests								
Control Group:	Cross-listed				Never-cross-listed			
			Matched sample				Matched sample	
Dependent variable:	Capex-to-TA	Asset Growth	Capex-to-TA	Asset Growth	Capex-to-TA	Asset Growth	Capex-to-TA	Asset Growth
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CF_t	0.1808***	0.7009***	0.1709***	0.5562***	0.1934***	0.9178***	0.1466***	0.7944***
	(8.00)	(11.26)	(4.88)	(3.84)	(16.49)	(28.07)	(5.31)	(10.86)
$Treat_i$	0.0037	-0.0240**	0.0015	-0.0253	0.0325***	0.0463***	0.0157***	0.0221
	(0.90)	(-1.97)	(0.32)	(-1.42)	(7.49)	(2.65)	(2.90)	(1.28)
$Delist_t$	-0.0181***	-0.0221	-0.0188***	-0.0206	-0.0252***	-0.0598***	-0.0189***	-0.0374***
	(-3.09)	(-1.59)	(-3.04)	(-1.35)	(-4.96)	(-3.38)	(-3.27)	(-3.71)
CF_t x $Delist_t$ x $Treat_i$	0.0880***	0.3150***	0.0908***	0.2832***	0.1165***	0.2559**	0.1189***	0.2335**
	(2.86)	(2.80)	(2.85)	(2.51)	(3.72)	(2.23)	(3.82)	(2.03)
CF_t x $Treat_i$	-0.1492***	-0.1368	-0.1401***	0.0243	-0.1493***	-0.2953***	-0.1992***	-0.1271
	(-5.36)	(-1.45)	(-3.31)	(0.15)	(-5.61)	(-3.18)	(-3.77)	(-1.06)
Q_{t-1}	0.0178***	0.0613***	0.0163***	0.0697***	0.01274***	0.0353***	0.0201***	0.0706***
	(9.94)	(8.20)	(6.72)	(6.45)	(13.27)	(8.64)	(8.02)	(8.12)
$SIZE_{t-1}$	-0.0103***	-0.0304***	-0.0103***	-0.0289***	-0.0080***	-0.0192***	-0.0081***	-0.0275***
	(-5.97)	(-7.99)	(-5.58)	(-7.37)	(-12.75)	(-11.43)	(-5.52)	(-7.00)
Constant	0.1830***	0.2890***	0.2101***	0.1783***	0.1225***	0.0267	0.1120***	0.2069**
	(5.34)	(3.11)	(6.13)	(2.10)	(9.59)	(0.59)	(3.78)	(2.11)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,078	9,078	5,384	5,384	92,152	92,152	6,647	6,647
R-squared	0.267	0.236	0.259	0.239	0.144	0.220	0.222	0.266
$[CF + CF \times Delist \times Treat + CF \times Treat]$	0.1196***	0.8791***	0.1216***	0.8637***	0.1606***	0.8784***	0.0663***	0.9008***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

TABLE 6: Investment-to-cash flow sensitivity. Subsamples of treatment group

Table 6 reports regression estimates of equation (1) for different subsamples of treatment firms; *Involuntary* group comprises firms that were forced to leave U.S. markets; *Voluntary* group ("All") includes firms that decided to leave U.S. exchange markets before ("Pre") and after ("Post") the passage of Rule 12h-6 of 2007. In models (1)-(4), we re-estimate equation (1) by subsamples of treatment firms as described before. In models (5)-(8), we re-estimate equation (1) according to Legal Origin, which is an indicator of institutional quality (e.g., La Porta, Lopez-De-Silanes and Shleifer (2008)). Then, we assign firms in high (low) group depending if they are from Common (Civil) Law countries. The dependent variable is *Investment*, which is measured as capital expenditures scaled by lagged PPE. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *Treat* is a dummy variable equal to one for firms included in our treatment group, and zero otherwise. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. All variables are defined in Appendix A.Is also reported the *p*-value of a *z*-test that evaluates whether the coefficient $\beta_4(CF_{i,t} \times Delist_{i,t} \times Treat_i)$ is equal across voluntary subsamples of before ("Pre") and after ("Post") the passage of Rule 12h-6. In all models standard errors are clustered by firm and year. Regressions include year, industry, and country fixed effects. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Capex-to-lagged PPE							
Subsample:	Involuntary	Voluntary						
					Legal Origin			
					High		*Low*	
		All	Pre-Rule	Post-Rule	Pre-Rule	Post-Rule	Pre-Rule	Post-Rule
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CF_t	0.2428***	0.2233***	0.2206***	0.2258***	0.1441	0.1367	0.7069***	0.7361***
	(3.68)	(3.62)	(3.44)	(3.45)	(1.50)	(1.39)	(2.98)	(4.20)
$Treat_i$	0.0117	-0.0176	-0.0056	-0.0349*	0.0172	-0.0535*	0.0215	0.0023
	(0.76)	(-1.24)	(-0.22)	(-1.78)	(0.40)	(-1.71)	(0.54)	(0.05)
$Delist_t$	-0.0306	-0.0271	-0.0449	0.0288	-0.0750	-0.0357	0.0232	-0.1562**
	(-0.69)	(-1.38)	(-1.53)	(0.88)	(-1.51)	(0.71)	(0.48)	(-2.22)
CF_t x $Delist_t$, x $Treat_i$	0.2523*	0.2187*	0.2301*	0.2594*	0.4503	0.1675	0.2124*	0.7998**
	(1.66)	(1.77)	(1.86)	(1.67)	(1.51)	(0.12)	(1.66)	(2.04)
CF_t x $Treat_i$	-0.0960	-0.2511**	-0.2912*	-0.3017**	-0.3556	-0.2637	-0.3863*	-0.6690**
	(-1.11)	(-2.60)	(-1.78)	(-2.49)	(-1.51)	(-1.19)	(-1.76)	(-2.32)
Q_{t-1}	0.0563***	0.0538***	0.0535***	0.0523***	0.0496***	0.0477***	0.454***	0.0434**
	(8.77)	(10.28)	(11.13)	(9.50)	(7.36)	(7.19)	(4.49)	(2.47)
$SIZE_{t-1}$	-0.0376***	-0.0325***	-0.0325***	-0.0347***	-0.0305***	-0.0305***	-0.0325***	-0.0380***
	(7.23)	(-7.69)	(-6.39)	(-6.68)	(-4.68)	(-4.48)	(-3.22)	(-4.14)
Constant	0.6919***	0.5617***	0.6017***	0.5329***	0.8360***	0.4714***	0.5316***	0.5725***
	(4.45)	(6.14)	(5.36)	(4.03)	(5.35)	(3.80)	(3.25)	(4.36)
(β_4Pre-Rule =β_4Post-Rule) (*p*-value)			(0.887)		(0.388)		(0.003)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,175	7,794	5,818	6,078	3,079	3,080	1,410	1,519
R-squared	0.202	0.202	0.205	0.209	0.180	0.178	0.289	0.298

TABLE 7: Investment-to-cash flow sensitivity. Event time analysis

Table 7 reports the regression estimates for equation (3) for our treatment group of firms (model 1), and including only the subsample of *Voluntary* delistings in model (2). The dependent variable is *Investment*, which is measured as capital expenditures scaled by lagged property, plant and equipment. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. All variables are defined in Appendix A *Pre Event* is an indicator variable that is one for years *t-2* and *t-1* relative to delisting event, and zero otherwise. *Event* is an indicator variable that is one for year *t* relative to delisting event, and zero otherwise. *Post Event* is an indicator variable that is one for years *t+1*, *t+2, and t+3* relative to delisting event, and zero otherwise. In all models standard errors are clustered by firm and year. Regressions include year, industry and country fixed effects. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Capex-to-lagged PPE	
	Treatment	Voluntary
	(1)	(2)
CF_t	0.0949	0.0252
	(1.25)	(0.26)
Pre Event	0.0018	-0.0053
	(0.12)	(-0.28)
Event	-0.0589***	-0.0504**
	(-2.75)	(-2.06)
Post Event	-0.0385*	-0.0392*
	(-1.75)	(-1.77)
CF_t x Pre Event	-0.0618	-0.0916
	(-0.72)	(-0.74)
CF_t x Event	0.2759*	0.4577**
	(1.75)	(2.36)
CF_t x Post Event	0.2057*	0.2926**
	(1.66)	(2.05)
Q_{t-1}	0.0663***	0.0579***
	(7.05)	(4.68)
$SIZE_{t-1}$	-0.0351***	-0.0316***
	(-7.75)	(-4.97)
Constant	0.5578***	0.5235***
	(5.80)	(4.23)
(CF_t x Pre Event=CF_t x Event) (*p*-value)	(0.024)	(0.002)
(CF_t x Post Event=CF_t x Event) (*p*-value)	(0.734)	(0.424)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Observations	4,187	2,903
R-squared	0.217	0.226

TABLE 8: Investment-to-cash flow sensitivity. Matched samples

Table 8 shows regression estimates of equation (1) using a matched sample of treatment and control group of firms. Firms are matched by country, year, industry, and by two alternate financial constraint criteria: *Payout Ratio* and *Rating*. The dependent variable is *Investment*, which is measured as capital expenditures scaled by lagged property, plant and equipment. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *Treat* is a dummy variable equal to one for firms included in our treatment group, and zero otherwise. *Delist* $_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. All variables are defined in Appendix A. In model (1) we use *Payout Ratio*, measured as total distributions scaled by operating income, as described in Appendix B. In model (2) we use *Rating*, which is estimated using the model proposed by Lemmon and Zender (2010) that predicts whether a firm has a bond rating in a given year. In all models standard errors are clustered by firm and year. Regressions include year, industry and country fixed effects. Matched samples are constructed using the PSM technique, where each treatment firm is matched to a control firm by year, country, industry, and *Payout ratio/ Rating*, by selecting the nearest neighbor (with replacement). The *p*-value of Likelihood-ratio (LR) test is also reported (in parentheses). The last two rows show the sum and the respectively *p*-value of the coefficients $[CF + CF \times Delist \times Treat + CF \times Treat]$. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Capex-to-lagged PPE	
Financial Constraint criterion:	Payout Ratio	Rating
	(1)	(2)
CF_t	0.0315	0.0689
	(0.20)	(0.57)
$Treat_i$	-0.0116	0.0013
	(-0.54)	(0.07)
$Delist_t$	-0.0481**	-0.0447**
	(-2.49)	(-2.38)
CF_t x $Delist_i$ x $Treat_i$	0.1748*	0.2053**
	(1.84)	(2.11)
CF_t x $Treat_i$	0.0397	-0.0139
	(0.22)	(-0.10)
Q_{t-1}	0.0598***	0.0595***
	(7.70)	(7.19)
$SIZE_{t-1}$	-0.0339***	-0.0343***
	(-8.36)	(-8.40)
Constant	0.5360***	0.5403***
	(5.92)	(5.71)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Observations	5,116	4,950
R-squared	0.206	0.193
PROPENSITY SCORE		
LR chi^2 (*p* value)	(0.731)	(0.100)
$[CF + CF \times Delist \times Treat + CF \times Treat]$	0.2460**	0.2603**
p-value	(0.014)	(0.011)

TABLE 9: Cash-to-cash flow sensitivity. Main Results

Table 9 reports regression estimates of equation (1) using different specifications. The dependent variable is *Cash Holdings*, which is measured as the ratio of cash and marketable securities scaled by lagged total assets. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *Treat* is a dummy variable equal to one for firms included in our treatment group, and zero otherwise. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. All variables are defined in Appendix A. Models (1)-(4) show results for the full sample using the primary control group of cross-listed firms. In model (4) we use a control matched sample of cross-listed firms. Firms are matched by country, year, industry, and *SIZE* using the using PSM technique (nearest neighbor with replacement). Models (5) and (6) show results using the alternate control group of never-cross-listed firms. In all models, except for model (2), standard errors are clustered by firm and year; in model (2) standard errors are clustered by country and year. The *p*-value of Likelihood-ratio (LR) test is also reported (in parentheses). Regressions include year, industry, country, and firm fixed effects in different combinations as indicated in the table, respectively. The last two rows show the sum and the respectively *p*-value of the coefficients $[CF + CF \times Delist \times Treat + CF \times Treat]$. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Cash and Marketable securities-to-lagged total assets					
Control group:	Cross-listed				Never-cross-listed	
	Baseline	Country	Firm FE	Matched Sample	Baseline	Matched Sample
	(1)	(2)	(3)	(4)	(5)	(6)
CF_t	-0.0087	0.0001	0.1579***	-0.1679**	0.2533***	-0.0239
	(-0.17)	(0.00)	(3.50)	(-2.45)	(14.84)	(-0.52)
$Treat_i$	0.0003	-0.0091		-0.0075	0.1063***	0.0776***
	(0.03)	(-1.02)		(-0.54)	(11.26)	(7.81)
$Delist_{i,t}$	-0.0388***	-0.0514***	-0.0344***	-0.0345***	-0.0400***	-0.0474***
	(-3.46)	(-4.52)	(-3.57)	(-2.71)	(-3.51)	(-3.42)
CF_t x $Delist_t$ x $Treat_i$	0.1540**	0.1304**	0.1261*	0.1636**	0.1291*	0.1048*
	(2.19)	(2.05)	(1.85)	(2.31)	(1.93)	(1.68)
CF_t x $Treat_i$	0.0321	0.0309	-0.0359	0.1940**	-0.3099***	0.0518
	(0.49)	(0.41)	(-0.60)	(2.49)	(-6.38)	(0.88)
Q_{t-1}	0.0457***	0.0452***	0.0314***	0.0441***	0.0365***	0.0497***
	(12.45)	(7.17)	(8.91)	(10.11)	(15.81)	(12.08)
$SIZE_{t-1}$	-0.0360***	-0.0326***	-0.0789***	-0.0317***	-0.0158***	-0.0264***
	(-13.67)	(-9.34)	(-11.45)	(-10.17)	(-20.79)	(-11.46)
Constant	0.5284***	0.5754***	1.2064***	0.4999***	0.1404***	0.3501***
	(7.94)	(8.91)	(12.80)	(6.49)	(8.62)	(5.24)
Firms FE	No	No	Yes	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	Yes
Country FE	Yes	No	No	Yes	Yes	Yes
Observations	9,078	9,078	9,078	5,384	92,152	6,647
R-squared	0.405	0.368	0.178	0.199	0.254	0.161
PROPENSITY SCORE						
LR chi^2 (*p* value)				(0.731)		(0.100)
$[CF + CF \times Delist \times Treat + CF \times Treat]$	0.1774***	0.1614***	0.2481***	0.1897***	0.0725	0.1327**
p-value	(0.003)	(0.001)	(0.000)	(0.002)	(0.238)	(0.017)

TABLE 10: Cash-to-cash flow sensitivity. Robustness tests

Table 10 reports regression estimates of equation (4) using different specifications. The dependent variable is *Cash Holdings*, which is measured as the ratio of cash and marketable securities scaled by lagged total assets. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *Treat* is a dummy variable equal to one for firms included in our treatment group, and zero otherwise. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. *Expenditures* represent capital expenditures scaled by lagged total assets. *Acquisitions* represent corporate acquisitions scaled by lagged total assets. *ΔNWC* is the changes in noncash net working capital scaled by lagged total assets. *Δ Short-Term Debt* corresponds to changes in short-term debt scaled by lagged total assets. All variables are defined in Appendix A. Models (1)-(4) show results for the full sample using the primary control group of cross-listed firms. In model (4) we use a control matched sample of cross-listed firms. Firms are matched by country, year, industry, and *SIZE* using PSM technique (nearest neighbor with replacement). Models (5) and (6) show results using the alternate control group of never-cross-listed firms. Regressions include year, industry, country, and firm fixed effects in different combinations as indicated in the table, respectively. The *p*-value of Likelihood-ratio (LR) test is also reported (in parentheses). The last two rows show the sum and the respectively *p*-value of the coefficients $[CF + CF \times Delist \times Treat + CF \times Treat]$. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Cash and Marketable securities-to-lagged total assets					
Control group:	Cross-listed				Never-cross-listed	
	Baseline	Country	Firm FE	Matched Sample	Control	Matched Sample
	(1)	(2)	(3)	(4)	(5)	(6)
CF_t	0.0441	0.0499	0.1677***	-0.1256	0.2514***	0.0094
	(0.78)	(0.56)	(3.65)	(-1.52)	(15.48)	(0.20)
$Treat_i$	0.0004	-0.0086		-0.0099	0.0972***	0.0742***
	(0.04)	(-0.96)		(-0.73)	(10.38)	(7.56)
$Delist_t$	-0.0394***	-0.0525***	-0.0276***	-0.0349***	-0.0365***	-0.0362***
	(-3.85)	(-3.65)	(-2.90)	(-2.97)	(-3.48)	(-3.54)
CF_t x $Delist_{,t}$ x $Treat_i$	0.1534**	0.1368**	0.0953*	0.1613**	0.1171*	0.1000*
	(2.26)	(2.15)	(1.73)	(2.35)	(1.94)	(1.65)
CF_t x $Treat_i$	0.0116	0.0124	-0.0163	0.1836**	-0.2638***	0.0548
	(0.16)	(0.16)	(-0.27)	(2.05)	(-5.55)	(0.97)
Q_{t-1}	0.0454***	0.0449***	0.0302***	0.0435***	0.0351***	0.0488***
	(11.92)	(6.66)	(8.54)	(9.54)	(15.49)	(11.11)
$SIZE_{t-1}$	-0.0353***	-0.0316***	-0.0729***	-0.0308***	-0.0145***	-0.0257***
	(-13.33)	(-8.77)	(-10.41)	(-9.75)	(-19.71)	(-11.17)
$Expenditures_t$	-0.1174**	-0.0958	0.0141	-0.1268*	-0.0868***	-0.1199**
	(-2.52)	(-1.55)	(0.30)	(-1.94)	(-10.76)	(-2.29)
$Acquisitions_t$	-0.1404***	-0.1712***	-0.1084***	-0.1320*	-0.1541***	-0.2304***
	(-2.57)	(-4.12)	(-3.27)	(-1.89)	(-6.50)	(-2.89)
ΔNWC_t	-0.0004	-0.0004	0.0000	-0.0009	-0.0001	-0.0005
	(-0.46)	(-0.76)	(-0.03)	(-0.83)	(-0.78)	(-0.84)
ΔShort Term $Debt_t$	0.0086***	0.0081***	0.0074***	0.0096***	0.0421***	0.0169***
	(4.92)	(3.30)	(4.90)	(3.89)	(28.80)	(4.73)
Constant	0.5267***	0.5723***	1.1261***	0.5074***	0.1308***	0.3323***
	(7.77)	(8.63)	(11.74)	(6.28)	(7.98)	(5.25)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	Yes	Yes	Yes
Country FE	Yes	No	No	Yes	Yes	Yes
Observations	8,841	8,841	8,841	5,249	91,604	6,533
R-squared	0.412	0.373	0.188	0.194	0.277	0.159
PROPENSITY SCORE						
LR chi^2 (*p* value)				(0.731)		(0.100)
$[CF + CF \times Delist \times Treat + CF \times Treat]$	0.2091***	0.1991***	0.2467***	0.2193***	0.1047*	0.1642***
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.068)	(0.002)

TABLE 11: Cash-to-cash flow sensitivity. Robustness tests

Table 11 reports regression estimates of equation (4) using different specifications. The dependent variable is *Cash Holdings*, which is measured as the ratio of cash and marketable securities scaled by lagged total assets. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *Treat* is a dummy variable equal to one for firms included in our treatment group, and zero otherwise. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. *SIZE* is the logarithm of total assets. *Expenditures* represent capital expenditures scaled by lagged total assets. *Acquisitions* represent corporate acquisitions scaled by lagged total assets. *ΔNWC* is the changes in noncash net working capital scaled by lagged total assets. *Δ Short-Term Debt* corresponds to changes in short-term debt scaled by lagged total assets. All variables are defined in Appendix A. Panel A reports regression estimates for *Voluntary* group of treatment firms, further divided in before ("Pre") and after ("Post") the passage of Rule 12h-6 of 2007 in models (2)-(7). In models (4)-(7), we re-estimate equation (4) according to Legal Origin, which is an indicator of institutional quality (e.g., La Porta, Lopez-De-Silanes and Shleifer (2008)). Then, we assign firms in high (low) group depending if they are from Common (Civil) Law countries. Is also reported the *p*-value of a *z*-test that evaluates whether the coefficient $\beta_4(CF_{i,t} \times Delist_{i,t} \times Treat_i)$ is equal across voluntary subsamples of before ("Pre") and after ("Post") the passage of Rule 12h-6. Panel B shows regression estimates of equation (4) using a matched sample of treatment and a control group of cross-listed firms. Firms are matched by country, year, industry, and by two alternate financial constraint criteria: *Payout Ratio* and *Rating*. In model (1) we use *Payout Ratio*, measured as total distributions scaled by operating income, as described in Appendix B. In model (2) we use *Rating*, which is estimated using the model proposed by Lemmon and Zender (2010) that predicts whether a firm has a bond rating in a given year. In all models standard errors are clustered by firm and year. Regressions include year, industry, country, and firm fixed effects. The last two rows show the sum and the respectively *p*-value of the coefficients $[CF + CF \times Delist \times Treat + CF \times Treat]$. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

Panel A: Cash-to-cash flow sensitivity. Robustness tests. Subsamples of treatment group							
Dependent variable: Cash and Marketable securities-to-lagged total assets							
				Legal Origin			
				High		*Low*	
	Voluntary	Pre-Rule	Post-Rule	Pre-Rule	Post-Rule	Pre-Rule	Post-Rule
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CF_t	0.0356	0.0522	0.0495	-0.0410	-0.0477	0.2302**	0.2125**
	(0.61)	(0.88)	(0.85)	(-0.55)	(-0.65)	(2.44)	(2.51)
$Treat_i$	-0.0014	-0.0034	-0.0099	-0.0218	-0.0499**	0.0071	0.0164
	(-0.13)	(-0.18)	(-0.69)	(-0.75)	(-2.38)	(0.29)	(0.46)
$Delist_t$	-0.0498***	-0.0627***	-0.0124	-0.0557**	0.0078	-0.0633***	0.0177
	(-5.16)	(-4.09)	(-0.84)	(-2.04)	(0.38)	(-4.06)	(0.56)
CF_t x $Delist_t$ x $Treat_i$	0.2628***	0.2613**	0.1622*	0.3233	0.1212	0.1623**	0.2361*
	(3.25)	(2.31)	(1.87)	(1.77)	(0.79)	(1.95)	(1.79)
CF_t x $Treat_i$	-0.0993	-0.0948	-0.0044	-0.0443	0.0617	-0.3269*	-0.1630
	(-1.35)	(-1.03)	(-0.05)	(-0.34)	(0.58)	(-1.80)	(-1.58)
Q_{t-1}	0.0423***	0.0421***	0.0437***	0.0477***	0.0458***	0.0119*	0.0235***
	(10.48)	(9.93)	(10.16)	(8.89)	(8.47)	(1.83)	(3.60)
$SIZE_{t-1}$	-0.0369***	-0.0383***	-0.0386***	-0.0374***	-0.0377***	-0.0396***	-0.0352***
	(-12.79)	(-10.86)	(-10.91)	(-7.88)	(-7.78)	(-5.88)	(-4.64)
$Expenditures_t$	-0.0783	-0.1192**	-0.1011**	-0.0345	0.0249	-0.0071	-0.0541
	(-1.47)	(-2.10)	(-1.98)	(-0.34)	(0.28)	(-0.10)	(-0.67)
$Acquisitions_t$	-0.1381***	-0.1529***	-0.1521***	-0.2040***	-0.1481**	-0.0493	-0.409
	(-2.73)	(-2.70)	(-3.26)	(-2.95)	(-2.42)	(-0.57)	(-0.63)
ΔNWC_t	0.0001	-0.0000	0.0005	0.0002	0.0006	-0.0003	0.00082
	(0.08)	(-0.01)	(0.45)	(0.22)	(0.54)	(-0.21)	(0.46)
ΔShort Term $Debt_t$	0.0092***	0.0089***	0.0094***	0.0060***	0.0065***	0.0114***	0.0082**
	(5.14)	(5.82)	(4.34)	(4.35)	(3.25)	(2.66)	(2.55)
Constant	0.5664***	0.5424***	0.5031***	0.7986***	0.6919***	0.5802***	0.5038***
	(8.08)	(6.82)	(7.78)	(5.93)	(7.79)	(5.00)	(4.97)
(β_4Pre-Rule =β_4Post-Rule) (p-value)		(0.460)		(0.833)		(0.845)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,594	5,662	5,924	2,935	2,937	1,402	1,511
R-squared	0.427	0.425	0.448	0.392	0.402	0.411	0.574

Panel B - Cash-to-cash flow sensitivity. Robustness tests. Matched samples		
	Dependent variable: Capex-to-lagged PPE	
Financial Constraint criterion	Payout ratio	Rating
	(1)	(2)
CF_t	-0.0407	-0.1043
	(-0.07)	(-1.31)
$Treat_i$	-0.0090	-0.0015
	(-0.06)	(-0.12)
$Delist_t$	-0.0393***	-0.0407***
	(-3.32)	(-3.37)
CF_t x $Delist_t$ x $Treat_i$	0.1529**	0.1622**
	(2.22)	(2.40)
CF_t x $Treat_i$	0.0650	0.1323
	(0.87)	(1.54)
Q_{t-1}	0.0442***	0.0465***
	(9.98)	(10.67)
$SIZE_{t-1}$	-0.0321***	-0.0324***
	(-10.35)	(-9.03)
$Expenditures_t$	-0.1327*	-0.1140*
	(-1.82)	(-1.68)
$Acquisitions_t$	-0.1461**	-0.1091*
	(-2.09)	(-1.70)
ΔNWC_t	-0.0014	-0.0016**
	(-1.24)	(-2.08)
ΔShort Term $Debt_t$	0.0084***	0.0085***
	(2.87)	(3.81)
Constant	0.5186***	0.5381***
	(6.67)	(6.51)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	No
Observations	5,014	4,826
R-squared	0.410	0.410
PROPENSITY SCORE		
LR chi^2 (p value)	(0.731)	(0.100)
$[CF + CF \times Delist \times Treat + CF \times Treat]$	0.1772***	0.1902***
p-value	(0.000)	(0.002)

TABLE 12: Investment sensitivity to stock prices and information shocks post-cross-delisting

Table 12 reports regression estimates of equation (5). We use two proxies of information asymmetry: 1) the *Bid-Ask spread is* measured as annual median of the daily difference between ask and bid prices, scaled by the midpoint; 2) and *R&D* expenses. We compute changes on these measures around the cross-delisting year (*t*), from years *t-1 to t+1* and *t-2 to t+3*. The dependent variable is *Investment*, which is measured as capital expenditures scaled by lagged PPE. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *INF* is set to one for firms whose changes in *Bid-Ask spread* and in *R&D* expenses are above median, and zero otherwise. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *SIZE* is the logarithm of total assets. All variables are defined in Appendix A. In all models standard errors are clustered by firm and year. Regressions include year, industry and country fixed effects. The last two rows show the sum and the respectively *p*-value of the coefficients $[Q + Q \times Delist \times INF + Q \times Delist + Q \times INF]$. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Capex-to-lagged PPE			
Information proxy:	Bid-Ask spread		R&D	
	(*t-1*;*t+1*)	(*t-2*;*t+3*)	(*t-1*;*t+1*)	(*t-2*;*t+3*)
	(1)	(2)	(3)	(4)
Q_{t-1}	0.0650***	0.0665***	0.0608**	0.0604***
	(5.73)	(5.28)	(5.02)	(5.27)
$Delist_t$	-0.0871*	-0.0926*	-0.1136**	-0.1162**
	(-1.81)	(-1.89)	(-2.49)	(-2.59)
INF_t	-0.0181	0.0028	-0.0614	-0.0349
	(-0.24)	(0.04)	(-1.06)	(-1.24)
Q_{t-1}x $Delist_t$ x INF_t	-0.1246***	-0.1004**	-0.1443***	-0.0919***
	(-2.71)	(-2.44)	(-4.01)	(-3.66)
Q_{t-1}x $Delist_t$	0.0329	0.0353	0.0530*	0.0562*
	(1.15)	(1.14)	(1.88)	(1.79)
Q_{t-1}x INF_t	0.0147	-0.0101	0.0396	0.0199
	(0.36)	(-0.31)	(1.32)	(1.58)
$Delist_t$ x INF_t	0.1562*	0.1329*	0.2117***	0.1243***
	(1.71)	(1.77)	(2.74)	(3.24)
CF_t	0.1174**	0.1153*	0.1210**	0.1204**
	(1.99)	(1.89)	(2.09)	(2.03)
$SIZE_{t-1}$	-0.0355***	-0.0359***	-0.0353***	-0.0355***
	(-8.29)	(-8.43)	(-7.85)	(-8.06)
Constant	0.5011***	0.4986***	0.5066***	0.5100***
	(5.13)	(4.96)	(5.11)	(5.11)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	No	No
Country FE	Yes	Yes	No	No
Observations	4,187	4,187	4,187	4,187
R-squared	0.220	0.221	0.223	0.219
$[Q + Q \times Delist \times INF + Q \times Delist + Q \times INF]$	-0.0120*	-0.0087	0.0091*	0.0446***
p-value	(0.083)	(0.198)	(0.099)	(0.008)

TABLE 13: Investment sensitivity to stock prices. Robustness tests

Table 13 reports regression estimates for equation (5). We use two proxies of information asymmetry: 1) the *Bid-Ask spread* is measured as annual median of the daily difference between ask and bid prices, scaled by the midpoint; 2) and *R&D* expenses. We compute changes on these measures around the cross-delisting year (*t*), from years *t-1 to t+1*. The dependent variable is *Investment*, which is measured as capital expenditures scaled by lagged PPE. *Q* is the market value of equity plus book value of assets minus book value of equity scaled by the book value of assets. $Delist_t$ is an indicator variable equal to one if a treatment firm is delisted in year *t*, and zero otherwise. *INF* is set to one for firms whose changes in *Bid-Ask spread* and in *R&D* are above median, and zero otherwise. *Cash Flow* is the net income plus depreciation and amortization expenses scaled by lagged total assets. *SIZE* is the logarithm of total assets. *Disclosure* is the disclosure requirements index proposed by La Porta, Lopez-De-Silanes and Shleifer (2006). *Market cap-to-GDP* is a financial indicator from World Bank. We assign firms based on *Disclosure index* and *Market capitalization* scaled by GDP as high or low according if they are above or below the median of these variables values, respectively, in their countries. All variables are defined in Appendix A. Is also reported the *p*-value of a *z*-test that evaluates whether the coefficient $\beta_4(Q_{i,t-1} \times Delist_{i,t} \times INF_{i,t})$ is equal across voluntary subsamples of *High* and *Low*. In all models standard errors are clustered by firm and year. Regressions include year, industry and country fixed effects. ***, ** and * mean statistical significance at the 1 percent level, 5 percent level and 10 percent level, respectively.

	Dependent variable: Capex-to-lagged PPE							
Information proxy:	bid-ask spread				R&D			
Governance proxy ranking:	Disclosure		Market cap-to-GDP		Disclosure		Market cap-to-GDP	
	High	*Low*	*High*	*Low*	*High*	*Low*	*High*	*Low*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Q_{t-1}	0.0693***	0.0513***	0.0469***	0.0803***	0.0645***	0.0453***	0.0458***	0.0733***
	(5.08)	(3.73)	(3.75)	(5.94)	(4.57)	(3.15)	(3.70)	(4.70)
$Delist_{,t}$	-0.1299*	-0.0854	-0.0945	-0.1052*	-0.1511**	-0.1081*	-0.1270**	-0.1237**
	(-1.76)	(-1.34)	(-1.44)	(-1.91)	(-2.24)	(-1.77)	(-2.08)	(-2.07)
INF_t	0.0859	-0.0842*	-0.0029	-0.1813***	-0.0001	-0.1589**	-0.0117	-0.1506***
	(1.09)	(-1.87)	(-0.04)	(-2.75)	(-0.34)	(-2.30)	(-0.26)	(-2.67)
Q_{t-1} x $Delist_t$ x INF_t	-0.0928	-0.1274**	-0.0858*	-0.2028**	-0.1285*	-0.2065***	-0.0924	-0.1955***
	(-1.62)	(-2.08)	(-1.82)	(-2.01)	(-1.95)	(-3.01)	(-1.64)	(-3.22)
Q_{t-1} x $Delist_t$	0.0513	0.0414	0.0302	0.0567	0.0715*	0.0582	0.0444	0.0790**
	(1.20)	(1.01)	(0.85)	(1.63)	(1.92)	(1.33)	(1.29)	(2.06)
Q_{t-1} x INF_t	-0.0383	0.0384	-0.0124	0.1429**	0.0141	0.0894**	0.0046	0.0900***
	(-1.32)	(1.64)	(-0.49)	(2.47)	(0.42)	(1.98)	(0.21)	(2.82)
$Delist_{i,t}$ x INF_t	0.0360	0.2369**	0.0593	0.3025*	0.1220	0.3522***	0.1323	0.2559***
	(0.34)	(2.09)	(0.60)	(1.95)	(1.02)	(3.20)	(1.43)	(2.86)
CF_t	0.0738	0.2160**	0.1381*	0.0673	0.0844	0.2120**	0.1443*	0.0885
	(0.91)	(2.00)	(1.82)	(0.74)	(1.04)	(2.03)	(1.86)	(1.09)
$SIZE_{t-1}$	-0.0477***	-0.0351***	-0.0469***	-0.0261***	-0.0469***	-0.0356***	-0.0461***	-0.0267***
	(-6.27)	(-4.36)	(-6.29)	(-6.17)	(-6.09)	(-4.27)	(-6.22)	(-6.06)
Constant	0.7702***	0.6147***	0.4005***	0.5198***	0.7532***	0.6296***	0.3923***	0.5271***
	(4.99)	(5.26)	(3.51)	(7.45)	(4.71)	(4.67)	(4.16)	(8.37)
(β_4Pre-Rule =β_4Post-Rule) (*p*-value)	(0.000)		(0.000)		(0.000)		(0.000)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,815	1,884	2,019	2,168	1,815	1,884	2,019	2,168
R-squared	0.216	0.259	0.183	0.321	0.214	0.267	0.180	0.326

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