Cross-Listing, Investment Sensitivity to Stock Price and the Learning Hypothesis

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Preliminary - Comments welcome

Abstract

Using a large sample of U.S. cross-listings, we show that cross-listed firms have a higher sensitivity of corporate investment to stock price than non cross-listed firms. This difference materializes after foreign firms access the U.S. markets (as it does not exist before) and is persistent. These findings are strong and robust to various controls, e.g., whether firms are financially constrained or not. The positive impact of a cross-listing on the sensitivity of investment-to-stock price is significantly smaller for firms incorporated in countries that rank low on measures on governance and disclosure quality. Moreover, this cross-listing effect increases with proxies for the extra information that a U.S. cross-listing generates for firms' managers. We argue that these findings support the hypothesis that a cross-listing enables managers to learn more information from the stock market, which then they use to make their corporate investment decisions.

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1. Introduction

Multiple listings are a widespread and enduring phenomenon. For instance, Gagnon and Karolyi (2010) report that about 3,000 firms had two or more listings in 2008 and highlight that managers' appetite for international cross-listings does not fade, despite increasing market integration. On this ground, an extensive literature has developed to analyze why firms list abroad and what are the valuation benefits inherent in multi-national listings.[1] This line of research has considerably improved our understanding of international cross-listings but the question of whether and how a foreign listing affects corporate decision-making has received much less attention. Our contribution to this question is twofold. First, we document that a U.S. cross-listing has *real* consequences on managerial decisions since it significantly increases the sensitivity of firms' investment to their stock price. Second, we provide strong evidence that this effect arises because managers of cross-listed firms obtain more informative feedback from the stock market, and factor this new information into their real investment decisions. As such, our findings suggest that one way foreign firms can benefit from a U.S. cross-listing materializes through the increased capacity of managers to learn information from their stock price.

The idea that managers can extract valuable information from the stock market is not new. Dow and Gorton (1997) and Subrahmanyam and Titman (1999) argue that stock prices aggregate information about firms' growth opportunities from many different participants who do not have channels to communicate with the firm other than via the trading process. As a result, stock prices may convey valuable information that managers do not have and, in turn, can guide them towards more efficient investment decisions. There is growing evidence supporting this hypothesis that managerial decisions rely in part on the information conveyed by stock prices (e.g. Durnev, Morck, and Yeung (2004), Luo (2005), Chen, Goldstein, and Jiang (2007), or Bakke and Whited (2010)). On this ground, we argue that a U.S. cross-listing increases the amount of information that managers can learn from the stock market and thereby improves their investment decisions. As modeled by Foucault and Gehrig (2008), a U.S. cross-listing acts as a mechanism to expand the set of investors who have and collect specific information about firms' growth prospects. The stock price of cross-listed firms

[1] See Karolyi (2006), Karolyi (2010) and Gagnon and Karolyi (2010) for surveys of this literature.

therefore comprises more information (e.g. Fernandes and Ferreira (2008)) and in turn may provide better guidance for investment decisions.[2] For instance, the stock price of a cross-listed company may incorporate some specific information that only U.S. investors possess about the value of prospective investment opportunities. Such information could stem, among others, from a specific expertise in assessing firms' strategy that is not available in domestic markets (e.g. Chemmanur and Fulghieri (2006) or a privileged access to relevant information about the prospects of firms' foreign (i.e., U.S.) operations (e.g.Choe, Kho, and Stulz (2005))

To test this conjecture, we follow Chen, Goldstein, and Jiang (2007) and examine the relation between a U.S. cross-listing and the sensitivity of firms' investment to their stock price. The logic of this approach is as follows. When deciding on the level of investment that maximizes the expected value of their firms, managers will use all the information available to them. This set includes the information aggregated in the stock price, as well as their private information that has not been incorporated into the price yet. In this context, if a U.S. cross-listing enhances the amount of information in price that is new to managers, we expect the investment of cross-listed firms to be more sensitive to their stock price than that of non-cross-listed firms. Using a large sample of U.S. cross-listings (794 firms) from 38 countries over the period 1989-2007, we confirm this hypothesis. The investment-to-price sensitivity of cross-listed firms is about twice that of benchmark firms that never cross-listed in the U.S. (19'565 firms). The economic magnitude of this cross-listing effect is substantial: a one standard deviation increase in price is associated with a 5.4% increase in corporate investment for non-cross-listed firms but an 11.6% increase for cross-listed firms (about 43% of the average level of corporate investment in our sample). Additional specifications show that this effect is robust to various estimation methodologies, as well as a host of alternative definitions of corporate investment.

In a second set of tests, we exploit the temporal dimension of our sample and track the investment-to-price sensitivity in event-time around the cross-listing date. The estimated patterns are

[2] This mechanism operates in two ways. First, there exist foreign informed investors who do not invest in the domestic stock market of a firm because, for instance, of investment restrictions, trading costs or lack of protection of their property rights. A cross-listing enables these investors to trade the firm stock and makes thereby its stock price more informative. Moreover, other things equal, unrestricted informed investors have more markets in which they can exploit their private information.

striking. Before accessing the U.S. markets, the investment-to-price sensitivity of firms that will cross-list is not significantly different from that of firms that never cross-list. But this sensitivity significantly jumps once firms become cross-listed on U.S. exchanges. Ruling out concerns about reverse-causality, the observed increase in the sensitivity of investment to price *follows* the cross-listing event and not the reverse. We also show that the positive effect of cross-listing on the investment-to-price sensitivity is long-lasting. Even ten years after they enter the U.S. markets for the first time, cross-listed firms continue to exhibit a higher investment-to-price sensitivity than their domestic peers. In addition, we check the robustness of our finding to self-selection issues by using Heckman (1979) two-stage estimation procedure. Again, the positive impact of a U.S. listing on the investment-to-price sensitivity remains and the magnitude of this cross-listing effect is not affected. Overall, these ancillary tests alleviate the concern that our results are contaminated by unobservable factors that may change around the cross-listing event and bias our estimates.

To provide further support for the learning hypothesis, we turn to cross-sectional comparisons. Arguably, if the increase in the investment-to-price sensitivity reflects more intense learning from managers, the cross-listing effect should be stronger when stock prices are more likely to contain private information otherwise not available to managers ("new to managers") after they access the U.S. markets. Several tests provide support for this conjecture. In particular, we show that the impact of a U.S. cross-listing on firms' investment-to-price sensitivity is magnified when a firm realizes a higher fraction of its sales abroad or when its main business line is more represented in the U.S than in its home country. Arguably, in these cases, U.S. investors are more likely to possess an expertise in assessing the firm's strategy that is not available in the firm's home country. Thus, price movements are more likely to reflect some information yet unknown to managers.

From a related perspective, the learning model of Foucault and Gehrig (2008) also predicts that the effect of a cross-listing on the investment-to-price sensitivity should be stronger when the fraction of non-discretionary liquidity traders (i.e., liquidity traders who exclusively trade in their country of origin) is more evenly distributed between the home and the domestic country. Indeed, in this case, it is easier for informed investors to camouflage their trades in both the domestic and the foreign market. This effect magnifies the impact of a cross-listing on the production of information

that is new to managers. This prediction is also borne out by our cross-sectional tests. Specifically, we report that the cross-listing effect is stronger when cross-listed firms are owned by more informed U.S. investors, i.e. U.S. institutional investors, or when more trading activity takes place on U.S. markets.

Complementarily, we find that the positive impact of a U.S. cross-listing on firms' investment-to-price sensitivity is linked to how managers allocate corporate resources. Firms that experience a significant increase in their investment-to-price sensitivity after they access the U.S. markets also display better operating performance. Specifically, while an average firm exhibits a 2% (8%) increase in its return-on-assets (sales growth) after it cross-list on U.S. exchanges, this improvement rises to 3.7% (11.6%) if the U.S. listing also triggers an surge in the firm's investment-to-price sensitivity. Overall, these estimates are consistent with the idea that the managers of cross-listed transform the extra informative feedback received from the stock market into more efficient investment decisions.

While the above findings are largely consistent with the idea that a U.S. cross-listing enhances managerial learning, there may be alternative explanations for the positive effect of a U.S. cross-listing on the sensitivity of investment to stock price. First, even in the absence of managerial learning, the investment of cross-listed firms could be more sensitive to prices simply because cross-listed firms "bond" themselves to higher governance and disclosure standards (Stulz (1999) or Coffee (1999) that forces managers to align investment decisions to their firms' fundamentals.[3] Second, as suggested by Baker, Stein, and Wurgler (2003) and Campello and Graham (2007), the observed increase in the investment-to-price sensitivity subsequent to a U.S. cross-listing could stem from a concurrent change in cross-listed firms' access to external capital.

We perform several ancillary tests that discard the validity of these alternative explanations. In particular, using standard proxies for the quality of domestic institutions, we estimate that the impact of a U.S. cross-listing on firms' investment-to-price sensitivity is more than two times larger for firms incorporated in countries where minority shareholders are well protected, the quality of disclosure is high and economic development is advanced. This finding is hard to reconcile with the idea that the increase in the investment-to-price sensitivity of cross-listed firms is due solely to the governance and disclosure improvements associated with a U.S. cross-listing ("bonding"). Indeed, if only stricter

[3] See Karolyi (2010) for a review of the governance implications of U.S. cross-listings.

governance and disclosure were at work, one would expect the cross-listing effect to be especially large for firms for which the gains in governance and disclosure are substantial. We find the opposite.[4]

Also, we document that the positive impact of a U.S. cross-listing on firms' investment-to-price sensitivity turns out to be stronger when firms face more financial constraints. Because previous research indicates that a U.S. cross-listing is accompanied with a *decrease* in financing constraints (Reese and Weisbach (2002), Hail and Leuz (2009), and Lins, Strickland, and Zenner (2005)), this pattern is inconsistent with the explanation that changes in financing constraints around the cross-listing time explains our results. In contrast, the observed pattern is consistent with the learning hypothesis. As it might be more difficult for financially constrained firms to exploit the positive signals sent by the stock market, the better access to financing offered by the U.S. listing seems to allow managers to better adjust their investment decisions to the information embedded in stock price.

This paper contributes to two different strands of research. First, by showing that a U.S. cross-listing significantly modifies managerial decisions at the corporate level, our paper adds to the vast literature that gauges the effects of international cross-listings. Moreover, our analysis complements existing research by identifying an additional source of benefits inherent to U.S. cross-listings. In spirit, our analysis is closely related to the papers that look at the informational consequences of a U.S. cross-listing (e.g., Baker, Nofsinger, and Weaver (2002), Bailey, Karolyi, and Salva (2006), or Fernandes and Ferreira (2008)). In particular, while Fernandes and Ferreira (2008) show that a U.S. cross-listing is associated with an increase in stock price informativeness, our results suggest that, at least in part, this improvement in price informativeness reflects information that is new to managers. Thus, managers of cross-listed companies can rely more on stock market feedback to make their investment decisions.[5]

From a related perspective, the cross-country results offer an intriguing counter-point to the existing literature. Traditionally, the various benefits associated with a U.S. cross-listing (e.g., valuation benefits) are stronger for firms incorporated in poor quality countries (e.g., Doidge, Karolyi

[4] The bonding hypothesis and the learning hypothesis applied to cross-listings are not mutually exclusive. In fact, improvement in governance may encourage investors to produce information about firms. If this is the case, the improvement in governance following a U.S. cross-listing would also contribute to make stock prices more informative for managers.

[5] For completeness, we check that, as found in Fernandes and Ferreira (2008), a cross-listing has a positive effect on price informativeness for firms in our sample (see Section 4.1).

and Stulz (2004) or Hail and Leuz (2009)). Consistent with the intuition outlined in Jin and Myers (2006), when we focus on the benefits coming from stock market feedbacks, the cross-listed firms coming from high quality countries stand out as the primary recipients.

Second, our results contributes to the vast literature that analyzes how stock prices affect corporate investment (e.g., Barro (1990), Morck, Shleifer and Vishny (1990), or Blanchard, Rhee, and Summers (1993)). A key challenge in this literature is to identify the source(s) of the positive relation between investment and stock prices. Indeed, this association may arise simply because stock prices passively reflect managers' information about their growth opportunities. Also, as explained previously, investment may correlate with stock prices because financially constrained firms can take advantage of high stock prices to tap the equity market, and use the new funds to finance investment (see for instance Stein (1996), Baker, Stein and Wurgler (2003), Campello and Graham (2007) or Polk and Sapienza (2008)). Last, the correlation between stock prices and investment may occur because managers learn valuable information from their stock price (the learning hypothesis).

While recent studies provide evidence in favor of the learning hypothesis (e.g., Durnev, Morck, and Yeung (2004), Luo (2005), Chen, Goldstein, and Jiang (2007), Bakke and Whited (2010), Frésard (2010), or Durnev (2010)), our analysis contributes to this line of research on various dimensions. First, empirical tests of the learning hypothesis usually rely on specific measures of price informativeness (Luo (2005) is one exception). One drawback of this approach is that there is no well accepted measure of private information in stock prices. By looking at the direct effect of a U.S. cross-listing on the sensitivity of firms' investment to their stock price, we circumvent the problem of measuring private information. Second, we document the presence of managerial learning in a sample of international firms. Interestingly, our cross-country findings suggest that the extent to which managers rely on stock market feedback is in part determined by the characteristics of their home-market (e.g., its level of financial development). This finding is consistent with Durnev (2010) who finds that in countries where political connections are more important, managers' investment decisions are less guided by their stock price.

In the next section, we describe the sample and introduce the empirical methodology. In Section 3, we document the positive effect of a U.S. cross-listing on firms' investment-to-price

sensitivity and show that this result is consistent with improved managerial learning. We explore alternative explanations in Section 4. We present our conclusions and discuss some implications for future research in Section 5.

2. Data and Methodology

2.1 Sample and Summary statistics

Our sample construction starts with all non-U.S. firms covered by Worldscope. For each firm, we collect market value of equity, total assets, capital expenditures, sales, cash flows, and additional variables that serve as proxies for firm profitability and financial policy for the period 1989-2006. All variables are measured in U.S. dollars and are detailed in the appendix. We exclude financial firms (SIC codes between 6000 and 6999) and utilities (SIC codes between 9000 and 9999) because their accounting numbers are largely dependent on statutory capital requirements. We also exclude those firms for which information on market value of equity, total assets, sales and capital expenditures is missing, as well as firms with total assets that are inferior to $10 million and firms with negative sales. To reduce the effect of outliers, we trim our sample at 1% in each tail of each variable.

Next, we identify foreign firms that are cross-listed on major U.S. stock exchanges (NYSE, Nasdaq, or Amex). We focus on cross-listings on U.S. exchanges (and voluntarily discard level I OTC cross-listings and Rule 144a private placements) because these firms experience a large improvement in their informational environment (e.g., Bailey, Karolyi and Salva (2006) or Fernandes and Ferreira (2008)), are visible and also actively traded by U.S. investors (e.g. Ammer, Holland, Smith, and Warnock (2008)). We keep track of cross-listings that are created as Level II and Level III (capital raising) ADR programs, ordinary listings as well as New York Registered Shares. We obtain cross-listing information (whether a firm has a foreign listing in the United States at the end of each year and the type of listing) from a variety of sources, including the Bank of New York, JP Morgan, Citibank, NYSE, Nasdaq, and the Center for Research on Security Prices (CRSP).[6] Our initial cross-listing sample comprises around 2000 cross-listed securities. As a single firm may have more than one

[6]See, for example, www.adrbny.com, www.adr.com and www.citibank.com/adr.

security cross-listed on U.S. exchanges (i.e. different types of shares – type A, type B, ordinary, preferred, etc…), we only consider each firm once, regardless of the number of cross-listed securities it has. In addition, to mitigate concerns about survivorship bias, we keep track of both active and inactive listings using the data provided by Citibank and CRSP. Moreover, we manually check and complete the listing dates and status by searching on Factiva and Lexis/Nexis.

[Insert Table 1 about here]

Table 1 describes the composition of our sample of cross-listed firms and firms that never cross-list (the benchmark). The sample consists of 794 foreign firms (7,193 firm-years) with shares cross-listed on U.S. stock exchanges. The benchmark sample contains 19,565 non-cross-listed companies, representing 130,304 firm-years. Notably, the sample has considerable geographic dispersion. Firms are located in 38 countries, 15 of which are emerging markets. Using the classification scheme of the Standard and Poor's Emerging Market Database, there are 142 cross-listed firms (1,422 firm-years) from developed markets and 652 (5,771 firm-years) from emerging markets.[7] Also, we note that the proportion of firms listed in the U.S. varies widely across countries. Austria, Hungary and Turkey have one firm with a U.S. cross-listing, whereas Canada, Israel and the U.K. have more than 60 cross-listed companies.

As explained in the introduction, the learning hypothesis rests on the idea that a U.S. cross-listing is associated with improved stock price informativeness. While Fernandes and Ferreira (2008) empirically validate this intuition, we check that this is the case in our sample by replicating their baseline tests in Section 3.1 below. To this end, we borrow their methodology and use firm-specific stock return variation as a proxy for price informativeness.[8] The notion (due to Roll (1988)) is that informed trades based on firm specific information increase the idiosyncratic risk of a stock. Therefore, stock returns are more informative when a stock becomes less correlated with the market returns. To compute this measure of price informativeness, we follow Durnev, Morck, and Yeung

[7] The Standard and Poor's Emerging Market Database classifies a market as emerging if it meets at least one of two general criteria: (1) it is located in a low- or middle-income economy as defined by the World Bank, and (2) its investable market capitalization is low in relation to its most recent GNP figures. This yields a few situations in which newly rich countries (such as Taiwan and Korea) are categorized as emerging markets. The classification is based on 1998 data.

[8] This measure of stock price informativeness is used for instance by Roll (1988), Wurgler (2000), Durnev, Morck, Yeung and Zarowin (2003), Jin and Myers (2006), and Chen, Goldstein and Jiang (2007). Chen, Goldstein and Jiang (2007) provide a detailed survey of the literature supporting the idea that high firm-specific return variation is a valid proxy for firm-specific information.

(2004) and Fernandes and Ferreira (2008) and define firm-specific return variation for each firm-year as $\psi_{i,t} = \ln[(1-R^2_{i,t})/ R^2_{i,t}]$, where $R^2_{i,t}$ represents the R^2 from a regression of firm *i* weekly returns on both the local and U.S. market returns in year *t*. The local and U.S. market indices are value-weighted and exclude the firm in question.

[Insert Table 2 about here]

Table 2 presents the mean, median and standard deviation for the main variables used in the subsequent analysis. Consistent with previous studies on U.S. cross-listings, we observe that cross-listed firms are almost ten times larger than their non-cross-listed peers. Also, in line with Doidge, Karolyi and Stulz (2004), cross-listed firms have markedly higher valuation and sales growth. While the average Tobin's Q (sales growth) is 1.525 (17.6%) for cross-listed firms, it is 1.089 (13.4%) for the benchmark sample. The ratio of capital expenditure to fixed assets does not appear to differ between the two sets of firms. Turning to price informativeness, the average value of $\psi_{i,t}$ is 1.942 in the entire sample and is slightly higher for non-cross-listed firms (1.942) than for cross-listed firms (1.924). These figures are similar to those reported by Fernandes and Ferreira (2008). Overall, our sample includes a broad cross-section of firm-years and firm characteristics suitable for our empirical investigation.

2.2 Measuring the investment-to-price sensitivity

To gauge whether and how a U.S. cross-listing allows managers to obtain more informative feedback from their stock price and use this extra information to decide on corporate investment, we examine the relation between U.S. cross-listings and the sensitivity of firms' investment to their stock price. To do so, we follow and adapt the approach of Chen, Goldstein, and Jiang (2007). Based on their argument, stock prices aggregate all public and private information about firms' fundamental value. Hence, when deciding upon the optimal level of investment, a value-maximizing manager will consider all relevant and available information. This set includes both private information that managers possess, and that is not yet integrated into the price, as well as the overall information aggregated in the stock price.[9] If

[9] As noted in Chen, Goldstein, and Jiang (2007), information that managers already had will move the price but not affect the investment decisions (as it already affected past investment) and thus will decrease the sensitivity of investment to price.

a U.S. cross-listing really enhances the amount of information in price that is new to managers, we expect the investment of cross-listed firms to be more sensitive to their stock price than that of similar non-cross-listed peers. To test this conjecture, we specify the following investment model:

$$I_{i,t} = \alpha + \beta_0 Q_{i,t-1} + \beta_1 Crosslist_{i,t-1} + \beta_2 Q_{i,t} \times Crosslist_{i,t-1} + \gamma_1 CF_{i,t-1} + \gamma_2 \log(TA_{i,t-1}) + \varepsilon_{i,t} \qquad (1)$$

where the subscripts *i* and *t* represent respectively the firm and the year. The dependent variable $I_{i,t}$ is a measure of corporate investment.[10] In our baseline specification, we define investment as the ratio of capital expenditures scaled by lagged fixed assets (property, plant and equipment). $Q_{i,t-1}$ is the normalized stock price, and is computed as the market value of equity (stock price times the number of shares outstanding) plus the book value of assets minus the book value of equity, scaled by book assets. The variable of interest $Crosslist_{it}$ is a dummy variable that is equal to one if a firm *i* is cross-listed in *t* and zero otherwise. In estimating equation (1), our primary interest is on the coefficient β_2, which measures the extent to which the association between investment and price differ for cross-listed firms. If managers learn more information from observing their stock price once cross-listed in the U.S., and incorporate this information into their investment policy, we expect this coefficient to be positive and significant.

To reliably estimate the combined effect of stock price and cross-listing in investment, we include control variables designed to capture a number of factors known to affect investment decisions that may also indirectly correlate with a firm's stock price and its cross-listing status. First, we include $Crosslist_{i,t}$ separately in order to account for the possibility that the investment levels of cross-listed firms differ from those of non-cross-listed firms due to some unobserved characteristics that are common to all cross-listed firms. We also include the natural logarithm of assets ($\log(TA_{i,t-1})$) to control for the impact of firm size on its corporate investment decisions. To account for the well documented relationship between cash flows and investment, we include cash flow ($CF_{i,t-1}$) as an additional control variable (e.g. Chen, Goldstein and Jiang (2007)). Moreover, the vector **α** includes a host of dummy variables that capture time-invariant firm heterogeneity (firm fixed-effects), systematic

[10] All the variables are described in the appendix.

differences in investment policies across countries (country fixed-effects), industries (industry fixed-effects defined at the 2 digit SIC codes level), and time (year fixed-effects). Finally, we allow the error term in (1) to be serially correlated for the same firm. Hence, in all estimations, the standard errors are adjusted for heteroskedasticity and within firm-period clustering as defined in Petersen (2009).

3. Empirical Findings

3.1 Cross-listings and stock price informativeness

Managers of dual-listed firms are more likely to learn new information from their stock price if a cross-listing has a positive impact on price informativeness in the first place. Fernandes and Ferreira (2008) empirically show that this is the case for a large sample of cross-listings. For completeness, we first check that this finding also holds in our sample since it is one building block of the mechanism described in Foucault and Gehrig (2008) to explain the effect of a cross-listing on the investment-to-price sensitivity and investment efficiency.

Specifically, we regress firm-specific return variation ($\psi_{i,t}$) on firms' cross-listing status, as well as factors that are likely to be related to firm-specific return variation, i.e. firm's size, book-to-market value, leverage and return-on-equity. In addition and to keep with Fernandes and Ferreira (2008)'s baseline specification, we further add country, industry, and year fixed effects. This specification is identical to their main regression.[11]

[Insert Table 3 about here]

The results are reported in Table 3 and are in line with those of Fernandes and Ferreira (2008) (Table 3, page 225). In column (1), we observe a positive and significant coefficient on *Crosslist*. All else equal, cross-listed firms display a higher firm-specific return variation than similar non-cross-listed firms. In columns (2) and (3) we augment the specification by adding year and firm fixed effects. The results are unchanged. Next, we differentiate the effect of cross-listing on price informativeness based on whether firms are incorporated in an emerging or developed market. To do so, we simply use a dummy variable, *Emerging*, which is equal to one if a firm is from an emerging

[11] See their specification (3) on page 224. Fernandes and Ferreira (2008) show that their result also holds with other measures of price informativeness.

market. Column (4) reveals that the coefficient on the interaction between *Crosslist* and *Emerging* is negative and marginally significant. Thus, the net effect of a cross-listing on price informativeness is nil for firms from emerging country. Overall, as in Fernandes and Ferreira (2008), the positive effect of a U.S. cross-listing on price informativeness is present only for firms from developed market firms in our sample. A similar picture emerges when we further control year, firm, and respectively country fixed effects.

Fernandes and Ferreira (2008) show that the difference between the effect of a cross-listing on price informativeness for firms from emerging markets and developed markets disappears once they control for the level of analysts coverage. Indeed, for emerging markets, the positive effect of a cross-listing on price informativeness is outweighted by the negative effect of the increase in analyst coverage on price informativeness.[12] These observations suggest that the effect of a cross-listing on the sensitivity of investment-to-price may be affected by the extent of analyst coverage for a firm. We examine this question in Section 3.5.

3.2 The impact of cross-listing on the sensitivity of investment to stock price

Overall, the findings in the previous section confirm those in Fernandes and Ferreira (2008): foreign firms benefit from more informative stock price when they list shares on a U.S. exchange.[13] Hence, a cross-listing can act as a mechanism to obtain more feedback from the stock market as predicted by Foucault and Gehrig (2008). If this mechanism operates, a cross-listing should enhance the sensitivity of investment-to-price. We now test whether this effect is present in our sample.

To measure the impact of cross-listing on the investment-to-price sensitivity, we estimate equation (1), as explained in Section 2.2. We report the results in Table 4. Column (1) presents the results obtained from an OLS estimation of our baseline specification (1). Consistent with previous studies (e.g., Barro (1990), Morck, Shleifer and Vishny (1990) or Blanchard, Rhee and Summers

[12] The reason is that the level of analysts of coverage is negatively associated with price informativeness and that a cross-listing generates additional analyst coverage (see for instance Lang, Lins and Miller (2003)).
[13] The only difference that we observe between ours and their results is the R^2 in our regressions. While they have R^2 between 0.20 and 0.35, ours are comprised between 0.01 and 0.04. The only exception arises when we include firm fixed-effects.

(1993)), firms' investment appears to be positively and significantly related to their stock price. In column (1), the coefficient on *Q* is 0.064 with a *t*-statistic of 34.39.

[Insert Table 4 about here]

Importantly, we observe that the interaction between *Q* and *Crosslist* has a positive coefficient of 0.072 and a *t*-statistic of 8.22. Compared to the coefficient on *Q*, this first estimate reveals that the investment of cross-listed firms is about two times more sensitive to their stock price than that of their non-cross-listed peers. The economic magnitude of the effect appears substantial. While a one standard deviation increase in *Q* (0.853) is associated with a 5.4% (0.853×0.064) increase in investment for non-cross-listed firms, it increases investment by 11.6% (0.853×(0.064+0.072) for cross-listed firms. This represents an increase of 43% of the sample average corporate investment (26.5%). This first test indicates that a U.S. cross-listing appears to substantially magnify the link between investment and stock price.

We note that the coefficients on the other variables have the expected sign: firms' cash flows are positively related to investment and bigger firms tend to invest significantly less. Notably, a U.S. cross-listing has a significant negative effect on the level of investment, other things equal. However, cross-listed firms have a higher *Q* on average. Accounting for this, the investment of the *average* cross-listed firms is 1.5% larger than that of the average non-cross-listed firms.[14]

Before exploring in more detail the characteristics of the investment-to-price sensitivity, we want to make sure that our inference is robust. For this, we extend our analysis in several dimensions. First, we alter our specification and estimation methodology. In column (2), we re-estimate specification (1) by adding firm fixed-effects to control for time-invariant firm characteristics. The results are virtually identical. With the inclusion of firm fixed effects, the coefficient on the interaction between *Q* and *Crosslist* remains large and statistically significant (0.065 with a t-statistic of 5.88). Moreover, to rule out the possibility that our results are biased by the comparison of firms with different size, columns (3) and (4) display regression results where we consider only firms with total assets larger than $100 million and $1000 million respectively. In column (5), we emulate Chen, Goldstein, and Jiang (2007) and estimate our investment model using the Fama and Macbeth (1973)

[14] The marginal effect corresponds to -0.94 + 0.072*1.525 (the average *Q*).

approach. In column (6) we re-estimate equation (1) without firms from the U.K. and Japan, the two countries that comprise the largest number of cross-listed firms. Our main result is robust across all these alternative specifications: there is a significant and positive effect of a U.S. cross-listing on firms' investment-to-price sensitivity. The estimates range between 0.033 (*t*-statistic of 3.61) to 0.063 (*t*-statistic of 5.88).

Taking a different angle, Figure 1 presents results of year-by-year estimations. Interestingly, the blue bars (i.e., estimates of β_1) indicate an upward trend in the investment-to-price sensitivity in our international sample. For an average firm, investment is almost three times more sensitive to price after 2004 than before 1994. Also, the red bars (i.e., estimates of β_2) reveal that the positive effect of a U.S. cross-listing is pervasive (and significant) throughout the sample period. Across all years, the investment-to-price sensitivity appears to be around twice larger for cross-listed firms. Overall, Figure 1 shows that the positive impact of cross-listing turns out to be an enduring phenomenon.

[Insert Figure 1 about here]

In addition, in Table 5, we examine whether the finding that a cross-listing enhances the sensitivity of investment to stock price is robust to five alternative measures of investment. First, instead of considering the ratio of capital expenditure to lagged fixed assets, we define corporate investment as capital expenditure scale by contemporaneous and lagged assets. Also, similar to Chen, Goldstein, and Jiang (2007), we use the sum of capital expenditures and R&D expenses, scaled by contemporaneous and lagged assets, as well as lagged fixed assets.[15] Finally, to account for corporate investment that takes the form of acquisitions and divestitures, we also use the annual change of total assets, scaled by lagged assets. Irrespective of the definition of investment, we observe positive and significant coefficients on the interaction between *Q* and *Crosslist*.

[Insert Table 5 about here]

3.3 Endogeneity concerns

So far, our results reveal that cross-listed firms display investment policies that are significantly more sensitive to their stock price than non-cross-listed firms. Our interpretation is that

[15] Given that Worldscope has a substantial amount of missing R&D information, we set R&D to zero when missing.

managers of cross-listed firms obtain more precise feedback from the stock market after a cross-listing and therefore makes their investment decision more sensitive to price. However, it is important to acknowledge that our estimates may be contaminated by two types of endogeneity biases. First, as recognized by recent studies in the cross-listing literature (Doidge, Karolyi and Stulz (2004), Hail and Leuz (2009) or Frésard and Salva (2010)), cross-listed firms represent a clearly non-random sample. In particular, firms with a higher sensitivity of investment to price might be more likely to cross-list shares on U.S. exchanges. Second, the positive association between a U.S. cross-listing and the investment-to-price sensitivity may arise even if there is no *causal* relation between them, simply because both a firm's cross-listing choice and its investment-to-price sensitivity are affected by common factors that are not observable to the econometrician. Indeed, a U.S. cross-listing is often accompanied by various changes in corporate policies and growth options that could render our estimates spurious

To address these issues, we first exploit the temporal dimension of our panel and compare the investment-to-price sensitivity for a given firm before and after it cross-lists. By examining whether U.S. cross-listings already have a higher sensitivity of investment *prior to* their U.S. listing, we can directly check whether reverse causality is a concern or not. Moreover, if the effect of a cross-listing on the investment-to-price sensitivity is long lasting, it is unlikely that this effect is driven by one time changes in financing, investment, or operating characteristics that occur contemporaneously with the cross-listing.

To perform this analysis, we create a set of "event time" dummy variables where the event year (year 0) represents the cross-listing year for a given firm. We consider a window that comprises ten years before and respectively ten years after the cross-listing. Then, to track the evolution of the investment-to-price sensitivity around the cross-listing event, we re-estimate our baseline specification (1) but replace *Crosslist* by the set of event time dummies.

[Insert Figure 2 about here]

Figure 2 depicts the coefficients on the interaction between *Q* and the event-time dummy variables, as well as their 95% confidence interval.[16] Several interesting patterns emerge from this figure. First, we note that none of the coefficients are significant prior to the cross-listing year. Hence, the investment-to-price sensitivity of firms that will cross-list is statistically not different than that of firms that never cross-list. However, following the U.S. listing, we observe that the coefficients on event-time dummies become positive and significant at the 5% level. Overall, the pattern displayed in Figure 2 reveals that the investment-to-price sensitivity of firms that cross-list on U.S. exchanges becomes relatively higher only *after* the cross-listing date. This evolution does not support the scenario in which a cross-listing is positively associated with the investment-to-price sensitivity because firms that cross-list already had a relatively high sensitivity prior to the cross-listing date.

Turning to the magnitude of the coefficients, Figure 2 reveals a substantial effect during the year that follows the U.S. cross-listing. Then, the effect of cross-listing on the investment-to-price sensitivity slightly weakens over the cross-listing life-time. This pattern may indicate that due to more intense information production at the time of the cross-listing, managerial learning is markedly more important shortly after the listing on U.S. exchanges. Yet, another interpretation for the weakening of the cross-listing effect could be that unobserved characteristics of cross-listed firms may have changed around their U.S. listing. For instance, as suggested by Doidge, Karolyi, and Stulz (2009) and Sarkissian and Schill (2009), growth opportunities could increase following the U.S. listing, creating a spurious association between investment and Q. The inclusion of firm-fixed effects or separate intercepts for all cross-listed firms (*Crosslist*) do not adequately control for these changes. However, these changes in firms' characteristics are likely to be transient. Thus, if they play a role, the impact of a cross-listing on the investment-to-price sensitivity should vanish over time. In contrast, we observe that even ten years after their U.S. listing, cross-listed firms continue to exhibit a significantly higher investment-to-price sensitivity than non-cross-listed firms. These dynamic results largely discard the risk that our estimates are confounded by unobservable factors that changes around the cross-listing date.

[16] Full tabulated results are available upon request.

To further curb the possibility that our inference is affected by self-selection biases, we take an alternative approach and implement Heckman (1979)'s two-step procedure, where the first stage models a firm's decision to cross-list (selection equation) and the second stage refers to our baseline investment equation (1) (outcome equation). For the first-stage (probit) estimation, we follow prior studies in our choice of instruments and include firms' size, leverage, sales growth, cash-flows, dependence on external finance, the fraction of foreign sales, the industry median market-to-book ratio, the country legal origin and market capitalization as well as industry and year fixed effects (see for instance Pagano, Roëll and Zechner (2002), Doidge, Karolyi and Stulz, 2004, or Fernandes and Ferreira, 2008).

[Insert Table 6 about here]

The first column of Table 6 presents the results of the probit estimation. Overall, the results support the conclusion of previous research. In particular, large firms, firms with a large fraction of sales realized abroad, and firms in need of external capital are more likely to cross-list. More importantly for our inference, the second column reports the results of the second-stage. Notably, the Inverse Mills ratio is not significant, suggesting the absence of any bias due to self-selection. As a result, we observe that the coefficient on the interaction between *Q* and *Crosslist* continues to be large and statistically significant (0.062 with a t-statistic of 7.56).

Overall the different tests in the section confirm the robustness of our main finding. All in all, a U.S. cross-listing has a positive and sustained effect on firms' investment-to-price sensitivity. In the following, we verify that this pattern is consistent with more intense managerial learning after firms cross-list in the U.S., and examine potential alternative explanations.

3.4. The learning hypothesis: Cross-sectional evidence

The increase in the investment-to-price sensitivity following a cross-listing is consistent with our hypothesis that a U.S. cross-listing enables managers to learn information unknown to them from their stock price. If this hypothesis is correct, the effect of a cross-listing on the investment-to-price sensitivity should be stronger when a U.S. cross-listing is more likely to encourage the production of information that is new to managers. Testing this hypothesis is challenging because the

econometrician does not directly observe the information used by managers for their decisions. To overcome this problem of identification, we use various proxies for the magnitude of the informational gains associated with a U.S. listing.

Our first proxy directly derives from Foucault and Gehrig (2008)'s model. In this model, the increase in the precision of the signal conveyed by stock prices to managers following a cross-listing is higher when the fraction of non discretionary liquidity traders (i.e., investors exclusively trade in their home market) is more evenly distributed between the foreign and the domestic market. As a result, this improvement is higher when trading volume is more evenly distributed between the home and U.S. markets (see Proposition 8 in Foucault and Gehrig (2008)).[17] Thus, we use the fraction of total trades that takes place on U.S. exchanges (*U.S. trading*) as one proxy for the informational gain inherent in a U.S. cross-listing and we expect the positive effect of a cross-listing on the investment-to-price sensitivity to be higher when there is more trading on U.S. markets.[18]

Second, regulatory hurdles or trading costs can prevent some U.S informed investors from investing abroad. In this case, a cross-listing is a way to glean information from these investors, which magnifies the positive effect of a cross-listing on price informativeness (see Section 3.3 in Foucault and Gehrig (2008)). Institutional investors are regarded as informed investors but U.S. institutional investors often face restrictions on their investment abroad.[19] Thus, we use the fraction of outstanding shares held by U.S. institutional investors given in 13(f) filings as another proxy for the informational gain associated with a cross-listing (*Institutions*). We expect the positive effect of a cross-listing on the investment-to-price sensitivity to be higher when their stock is owned by more U.S. institutional investors.

Alternatively, we consider the fraction of foreign sales as an additional proxy for informational gains (*Foreign Sales*). We hypothesize that investors have lower cost of information

[17] Indeed, in their model, the market share (in terms of trading volume) of the foreign market is entirely determined by the fraction of non discretionary liquidity traders in this market. Thus, this market share can be used as a proxy for non discretionary liquidity trades in the foreign market.
[18] Halling, Pagano and Zechner (2008) empirically study the distribution of trading volume between the home and the foreign market for cross-listed firms.
[19] Grinblatt and Keloharju (2000) or Seasholes (2000) provide evidence that foreign institutional investors are better informed than local investors.

acquisition on the value of projects whose cash-flows are mainly realized in their country.[20] As a result, a U.S. listing should elicit more information that is new to managers if a large fraction of its sales are realized abroad. Chemmanur and Fulghieri (2006) argue that a cross-listing can be a way to access investors with unique expertise in evaluating the firm. Based on this idea, we consider the difference in the percentage of the market capitalization of a firm's industry located in the U.S. and the percentage of industry market capitalization for a firm's industry in its home country (*U.S. Industry Relative*). We expect the informational gains associated with a U.S. cross-listing to be higher if the U.S. share of a firm's industry is high. Indeed, in this case, the U.S. market is likely to feature more investors with unique expertise in evaluating the firm's strategy, allowing managers to receive more feedback from the stock market.

For each of these proxies for the size of the informational gain associated with a U.S. cross-listing, we allocate each cross-listed firm in one of two groups (*High* and *Low*), depending on whether the proxy is above-median (*High*) or below-median (*Low*). Then, we re-estimate our baseline model (1) by interacting *Q* with *Crosslist* and *High* or *Low*. Table 7 (Columns 1 to 4) reports the results.

[Insert Table 7 about here]

Across all specifications, we observe a clear pattern. First, we observe that the investment-to-price sensitivity is in general higher for cross-listed firms, irrespective of the group to which they belong. The only exception is when we partition firms based on the fraction of shares held by U.S. institutional investors (in this case, the effect of a U.S. cross-listing is not statistically significant for firms with a relatively low fraction of U.S. institutional investors). Second, as expected, the effect of a cross-listing on the sensitivity of investment to price is higher when a firm belongs to the group for which the informational gain of a cross-listing are likely to be high. The difference is both statistically (see the F-test at the bottom of Table 7) and economically significant. For instance, while the effect of a cross-listing on the investment-to-price sensitivity is 0.039 (with a *t*-statistic of 4.46) when large fraction of the trading takes place in the U.S., it is 0.020 (with a *t*-statistic of 2.00) when the trading

[20] In Titman and Subrahmanyam (1999), a fraction of investors receive information about a firm's investment project by luck, at no cost. They argue that these investors could be for instance clients of the firm who learn about the potential demand for its products by consuming it. More information of this type will be obtained from investors abroad if a firm realizes a larger fraction of its sales abroad.

remains at home. Similarly, when a firm realizes a large fraction of its sales abroad, a cross-listing raises the sensitivity of investment to price by 0.083 (*t*-stat of 3.79) against 0.05 (*t*-stat of 5.34) when a firm realizes a small fraction of its sales in foreign markets.

As explained in Section 4.1, the effect of a cross-listing on price informativeness is smaller for cross-listed firms with high analyst coverage. One possibility is that the presence of analysts reduces the benefit of informed trading and therefore the positive effect of a cross-listing on the number of investors producing information specific to a firm.[21] If this information is known to managers, we expect the level of analyst coverage to dampen the impact of a cross-listing on the sensitivity of investment-to-price. To test this conjecture, column (5) of Table 7 reports the regression results when we partition cross-listed firms based on the number of analysts that have issued earnings forecasts during the previous year (*Coverage*). As expected, a cross-listing has a smaller effect on the sensitivity of investment-to-price for firms with high analyst coverage than for firms with low analyst coverage.

3.4. Investment efficiency

To further validate our interpretation of the results, this section explores the link between firms' investment-to-price sensitivity and the efficiency of their investment decisions. Indeed, if the observed increase in investment-to-price sensitivity really reflects the fact that the managers of cross-listed companies obtain from more informative feedbacks from the stock market, this cross-listing effect should translate into a better allocation of corporate resources. Yet, verifying this conjecture is complicated by the fact that we do not directly observe the investment-to-price sensitivity of each firm separately and also because the efficiency of investment decisions is difficult to measure empirically. To surmount these difficulties, we follow Durnev (2010) and proceed in two steps. In a first step, we attempt to identify which cross-listed firms experience an increase in their investment-price sensitivity following their U.S. listing. In a second step, we gauge whether this set of firms exhibits superior future operating performance, taken as a proxy for investment efficiency.[22]

[21] In line with this reasoning, Easley,O'Hara and Paperman (1998) show that the likelihood of informed trading is inversely related to analyst coverage.
[22] Arguably, more efficient investment decisions should translate into superior performance.

First, because we cannot estimate an investment-to-price sensitivity for each firm individually ($\beta_{i,t}$) from equation (1), we need infer it.[23] For that purpose, we re-estimate our baseline specification (1) without the interaction between *Q* and *Crosslist* and collect the residuals for each cross-listed firm in each year. As a first approximation, a positive residual indicates firms whose investment becomes more sensitive to stock price after their U.S. cross-listing. Then, using these residuals, we construct two dummy variables *Increase* and *Decrease*, which are equal to one for cross-listed observations with positive and respectively negative residuals. Appendix B provides more details about this methodology and its validity. Next, we use the whole sample of (cross-listed and non-cross-listed) firms and regress their future performance on *Increase*, *Decrease* and a set of control variables. To wit, if the increase in investment-to-price sensitivity truly reflects valuable managerial learning, we expect the coefficient on Increase to be positive.

[Insert Table 8 about here]

Table 8 outlines the performance results. In Panel A, we follow Durnev (2010) and Chen, Goldstein, and Jiang (2007) and measure performance by firms' annual return on assets (*ROA* defined as the percentage of earnings before interest, taxes, depreciation, and amortization to firms' total assets) and sales growth (Δ*Sales*). We first observe that the coefficient on *Crosslist* is positive and significant in both *ROA* and Δ*Sales* regressions. In line with Khurana, Martin, and Periera (2008), a U.S. cross-listing is positively associated to firm performance. However, this effect seems to depend on the change in investment-to-price sensitivity. Indeed, we note that the coefficient estimate on *Increase* is about two times larger than that on *Decrease*. This difference appears economically meaningful. For instance, while an average cross-listed firm exhibits an annual growth in sales that is 8% larger than that of a similar non-cross-listed firm it amounts to 11.6% when its investment-to-price sensitivity increases after cross-listing on a U.S. exchange.

In Panel B, we account for the fact that a change in investment triggered by more informative stock market feedback may take time to materialize into superior performance and replace annual *ROA* and Δ*Sales* by their average values over three years. Consistent with our conjecture that the managers of cross-listed companies benefit from more valuable feedbacks from the stock market, we continue to

[23] Indeed, the time series dimension of our panel is too short.

observe a larger coefficient on Increase. In a similar vein, the Appendix B reveals that the results in Table 8 are robust to different definitions of the *Increase* and *Decrease* dummies as well as several alternative econometric specifications. Taken together, the results in Table 8 provide suggestive evidence that the increased in firms' investment-to-price sensitivity is related to improved investment efficiency as it appears to enhance future operating performance.

4. Alternative explanations

While our results hitherto are largely consistent with managerial learning, we investigate two sets of alternative explanation. First, we examine whether the positive effect of a U.S. listing on the investment-to-price sensitivity reflects the improvement in governance and disclosure quality that coincide with a U.S. cross-listing. Second, we address the possibility that our findings are driven by a change in financing constraints that occur when foreign firms access the U.S. markets.

4.1. The impact of better governance and disclosure

Even in the absence of managerial learning, the investment of cross-listed firms could be more sensitive to prices simply because cross-listed firms "bond" themselves to higher governance and disclosure standards (Stulz (1999) or Coffee (1999)). Indeed, cross-listed firms must register with the SEC and subject themselves to U.S. securities laws. Also, they have to adopt most U.S. disclosure requirements. This "bonding hypothesis" has received strong empirical support in subsequent work (see for instance Reese and Weisbach (2002), Doidge, Karolyi and Stulz (2004, 2009), or Hail and Leuz (2009)). Importantly for our analysis, the existence of an effective bonding to the U.S. environment is partly consistent with more intense learning of managers. Indeed, as suggested by Fernandes and Ferreira (2008), a firm's commitment to a higher level of disclosure and transparency may alter the incentives of different market participants to collect and trade on private information, thereby augmenting the private information in prices. Alternatively, because U.S. securities laws and regulations improve the protection of minority investors from the expropriation by controlling shareholders, the extra protection granted by a U.S. cross-listing may promote informed arbitrage, rendering stock prices more informative (e.g. Jin and Myers (2006)).

One can imagine, however, mechanisms by which an improvement in firms' governance and disclosure environment could strengthen their investment-to-price sensitivity other than through its impact on price informativeness. For instance, the stricter governance and enhanced monitoring of the U.S. institutional setting could force managers to make investment choices that are more in line with firms' fundamentals, and less guided by the extraction of private benefits (e.g. Lel and Miller (2009), or Frésard and Salva (2010)). Because a firm's stock price carries information about fundamentals, bonding managers' hand could also lead to an increase of the link between firms' investment and their stock price (e.g. Bohren, Cooper, and Priestley (2009)). Alternatively, the association between price and investment could be higher after a cross-listing because improved disclosure standards enable investors to better forecast the cash-flows implications of firms' investment decisions.

To validate our interpretation of the cross-listing effect, it is important that we address this alternative explanation. To do so, we exploit the cross-country dimension of our dataset and investigate whether the impact of a U.S. cross-listing on the investment-to-price sensitivity depends on home-country characteristics. Arguably, if the increased investment-to-price sensitivity roots in the fact that a U.S. cross-listing bonds managers' hands, we should observe a larger effect for firms that extract the largest bonding benefits, i.e. firms incorporated in countries ranking low on governance and transparency measures. To test whether this is the case, we partition our sample based on the quality of country's institutions. First, we split firms into two groups according to their country's legal tradition (La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997)). Also, we partition firms from countries where investor protection (regulatory disclosure) is weak, that is, where the index of anti-self-dealing (disclosure) is below the median (*Low*), and those from countries where the index is greater to or equal to the median (*High*) (Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008), and La Porta, Lopez-de-Silanes, and Shleifer (2006)). We proceed similarly to partition countries based on their level of economic and financial development by using country's GDP per capital and stock market capitalization.

[Insert Table 9 about here]

Table 9 presents coefficient estimates, *t*-statistics and significance tests across subsamples. Irrespective of the country-level variable and partitioning, we continue to observe a positive and significant effect of a U.S. cross-listing on the sensitivity of firms' investment to their stock price. Strikingly, however, the magnitude of the cross-listing effect varies considerably across subgroups.[24] More precisely, the cross-listing effect is more than two times larger for firms coming from countries with good institutions and developed markets. Across the different specifications, the coefficients on the interaction between *Q* and *Crosslist* range between 0.030 and 0.045 in the *Low* subgroups, and go from 0.072 to 0.087 in the *High* partitions. The F-tests confirm that the differences between subgroups are statistically significant.

Unambiguously, Table 9 reveals that the positive effect of a U.S. cross-listing on the investment-to-price sensitivity is higher when cross-listed firms originate from countries where minority investors are well protected, disclosure quality is high, and development is advanced. These patterns do not support the notion that a U.S. cross-listing enhances the investment-to-price sensitivity because it improves firms' governance and disclosure environment. In contrast, they do not invalidate the learning hypothesis. For instance, firms from countries with high quality institutions might be better able to exploit the positive signals coming from the U.S. cross-listing because of better financing ability or superior managerial skills. From a different perspective, the differential effects we uncover could indicate that managers from certain countries rely relatively less on stock market feedbacks to decide on investment due to cultural or incentive differences.

While we do not attempt to disentangle between these stories, it is interesting to note that the results in Table 9 stand in sharp contrast with previous research. Indeed, the cross-listing literature traditionally documents that a U.S. listing mainly benefit to firms incorporated in emerging countries with a poor environment in terms of institutions and transparency. In particular, Doidge, Karolyi and Stulz (2004) and Hail and Leuz (2009) report that firms incorporated in poor quality countries achieve that largest valuation gains after they cross-list on U.S. exchanges. Interestingly, when it comes to the learning hypothesis, the benefits appear to be more prevalent for firms coming from high quality

[24] From a related perspective, Durnev (2010) reports that managers' investment decisions are less guided by their stock prices in countries where political connections are more prevalent.

countries. Thus, the learning hypothesis may provide a rationale for why so many firms from countries with similar level of development and institutional quality to the U.S. decide to cross-list on U.S. stock exchanges. While the examination of these questions is beyond the scope of this paper, our results points to interesting challenges for future research.

4.2 The impact of a change in financing constraints

Baker and Wurgler (2002) and Baker, Stein, and Wurgler (2003) argue that financing constraints can induce a positive association between investment and prices. Indeed, if stock prices deviate too much from fundamentals, overvalued firms can take advantage of irrationally low discount rates to issue securities at a cheaper price. Firms facing financial constraints are more likely to have unexploited positive NPV projects and therefore to channel the newly issued funds into investment. Thus, the combination of mispricing and financial constraints generates a positive linkage between stock prices and corporate investment. Consistent with this hypothesis, Baker, Stein, and Wurgler (2003) report that firms facing more financing constraint exhibit higher investment-to-price sensitivities.

Extant research shows that a U.S. cross-listing tends to relax financing constraint. For instance, Reese and Weisbach (2002), and Lins, Strickland, and Zenner (2005) report that cross-listed firms increase their capital raising activity following their U.S. cross-listing. In a similar spirit, Hail and Leuz (2009) and Ball, Hail, and Vasvari (2009) show that cross-listed firms benefit from a lower cost of capital. As a result, if financing constraints alone explain the relation between investment and stock prices, one should expect firms' investment-to-price sensitivity to *decrease* following their U.S. cross-listing. But we observe the exact opposite, which suggests that another mechanism is at work for the effect of a cross-listing on the investment-to-price sensitivity.

To further understand the relation between financing constraints, managerial learning and a U.S. cross-listing, we examine how the positive effect of a cross-listing on the investment-to-price sensitivity depends on firms' access to external finance. Firm-level data on the actual use and cost of external financing is typically not available in international samples. Hence, we define a measure of dependence on external finance (*External Finance*) at the industry level (4 digits SIC codes) and we

use this measure as a proxy for firms' access to external funds. As in Rajan and Zingales (1998), the external finance dependence of an industry (4 digits SIC codes) is the median value for this industry of the difference between capital expenditures and cash flow from operations, divided by capital expenditures over our sample period. A larger value for this variable for an industry means that firms in this industry are more dependent on external finance and therefore more likely to be financially constrained.

We then assign each firm to quintiles based on its industry measure of external dependence as in Baker, Stein and Wurgler (2003). Finally, we assess the sensitivity of our results to financial constraints by estimating equation (1) for each quintile separately. Table 10 reports the results.

[Insert Table 10 about here]

First, we observe that the investment-to-price sensitivity generally increases across quintiles from 0.054 (Q1) to 0.071 (Q5). Thus, Baker, Stein, and Wurgler (2003)' results holds in our international dataset. More importantly for our purpose, we find no evidence of a negative effect of cross-listing on firms' investment-to-price sensitivity: the coefficient estimate for the interaction between *Q* and *Crosslist* remains positive and significant across all quintiles. This estimate ranges from 0.06 in the fourth quintile to 0.083 in the third quintile.

Interestingly, we find a strong and positive effect of cross-listing (coefficient of 0.080 with a t-statistic of 8.21) even for firms in industries that are more financially constrained (fifth quintile). Again, this finding can be explained by the learning hypothesis. Intuitively, financing constraints prevent firms from fully exploiting information conveyed by their stock prices. For instance, while a high stock price may signal valuable investment opportunities, constrained firms lack fresh capital to take advantage of positive price signals. A U.S. cross-listing simultaneously improves stock price informativeness and eases financing constraints. As a result, managers benefit from better price signals, together with better financing opportunities to exploit them.

All in all, the results in Tables 10 show that the positive effect of cross-listing on firms' investment-to-price sensitivity is largely independent of financial constraints, and if anything, stronger for firms that are more financially constrained. This finding does not preclude the possibility that, other things equal, the lessening of financing constraints following a cross-listing does exert a negative

effect on the investment-to-price sensitivity of cross-listed firms. But the increase in investment-to-price sensitivity due to the accrued reliance of firms' managers on market prices as a source of information dominates this effect.

5. Conclusion

The main message of this paper is that a U.S. cross-listing enables managers to obtain more informative feedback from the stock market, which then they use to improve their investment decisions. Indeed, using a large sample of U.S. cross-listings from 38 countries over the period 1989-2007, we find that cross-listed firms have a higher sensitivity of corporate investment to stock price than non cross-listed firms. Moreover, this difference in the sensitivity of investment to stock price materializes after a cross-listing (as it does not exist before) and it is long-lasting. These findings are strong and robust to various controls, e.g., whether firms are financially constrained or not. Moreover, the impact of a U.S. cross-listing on the investment-to-price sensitivity increases with proxies for the extra information that managers can glean from their stock price after they access the U.S. markets. Also, we find suggestive evidence that this heightened managerial learning allows managers to make more efficient investment decisions.

These findings offer a new perspective on U.S. cross-listings and raise several questions for future research, two of which we outline here. First, the recent period has witnessed a substantial deceleration of the U.S. cross-listing activity as a large number of foreign firms have decided to delist from the U.S. markets. Analyzing this phenomenon, Doidge, Karolyi and Stulz (2010) report that firms terminate their U.S. cross-listing mainly because they no longer have valuable growth opportunities to finance. In light of our results, it would be interesting to also examine whether firms delist because their need to learn from the stock market has decreased.

From a related perspective, it would of interest to explore whether our results could be related to the location on which firms decide to cross-list. Pagano, Roell, and Zechner (2002) indicate that the choice of cross-listing market primarily reflects industry specificities. Sarkissian and Schill (2004) document that geographic, cultural, and economic proximity play a dominant role in the choice of overseas venue. According to our findings, an additional determinant could be related to the desire of

managers to obtain specific information feedback from their *host* stock market. These and other related questions we leave to future research.

Appendix A: Definitions and sources of the variables

This table provides definitions and sources of all the variables used in the analysis.

Variable	Definition	Source
Crosslist	Dummy variable that takes one if a firm is cross-listed on a U.S. exchange (level 2 and 3 ADR and ordinary listings) and zero otherwise	Various sources (see our sample construction)
Capex	Capital expenditures (in million USD)	Worldscope
(Tobin's) Q	(Book value of assets – book value of equity + market value of equity) / book value of assets	Worldscope
PPE	Property, Plant and Equipment	Worldscope
Total assets (TA)	Book value of total assets	Worldscope
CF/TA	Cash flows from operations over total assets	Worldscope
Δ*Sales*	Percentage change in (inflation-adjusted) sales over year *t-2* to *t*	Worldscope
ROA	Sum of earnings before interest, taxes, depreciation, and amortization over total assets	Worldscope
R&D	R&D expenses. Set to zero if missing	Worldscope
External Dependence	Industry technological dependence on external finance based on Rajan and Zingales (1998). Following their methodology, the external finance dependence measure is computed as the industry (4 digits SIC codes) median value of the difference between capital expenditures and cash flow from operations, divided by capital expenditures	Worldscope
Coverage	Number of analysts issuing at least one earnings forecasts over the year	I/B/E/S International summary files
Foreign Sales	Proportion of sales generated from operations in foreign countries over total sales	Worldscope
Ins. Holdings	Proportion of shares held by U.S. institutions as a fraction of common shares outstanding	CDA/Spectrum (SEC 13(f) filings)
U.S. Trading	Proportion of the total volume that takes place on U.S. markets defined as the trading volume ($) on U.S. exchange divided by the total (domestic and U.S.) volume ($)	Datastream and CRSP
U.S. Rel. Ind.	Difference in the percentage of the market capitalization of a firm's industry located in the U.S. and the percentage of industry market capitalization for a firm's industry in its home country	Worldscope

$\psi_{i,t}$	Firm specific return variation computed as $\psi_{i,t} = \ln[(1-R^2_{i,t})/ R^2_{i,t}]$, where $R^2_{i,t}$ represents the R^2 from a regression of firm i weekly returns on both the local and U.S. market returns in year t. The local and U.S. market indices are value-weighted and exclude the firm in question.	Datastram
MarketCap	Market capitalization (number of shares outstanding multiplied by end of year price)	Worldscope
LT Debt/TA	Long term debt divided by total assets	Worldscope
Book-to-Market	Book value of total assets divided by (the book value of assets – book value of equity + market value of equity)	Worldscope
ROE	Return on equity	Worldscope
Emerging	Dummy variable that takes the value of one if a foreign country is classified as an emerging market by the Standard and Poor's Emerging Market Database (1998 edition)	S&P Emerging Market Database

Appendix B: Identification of firm-level investment-to-price sensitivity [*TBD*]

- Describe the methodology in details
- Show that it identifies "correctly" firm-level investment-to-price sensitivity
- Explain the Monte-Carlo experiment
- Show that the results in table 8 are robust to different definitions and estimations techniques

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Figure 1: The effect of cross-listing on the investment-to-price sensitivity year-by-year

This figure reports results from year-by-year regressions of the effect of cross-listing on the investment-to-price sensitivity (equation (1)). The blue bars correspond to the estimated investment-to-price sensitivity for all firms in our sample (β_1). The blue bars correspond to the estimated extra investment-to-price sensitivity for cross-listed firm (β_2). The sample period is from 1989 to 2006. All estimations include country, year and industry fixed effects. The standard errors used to compute the confidence bounds are robust to heteroskedasticity and serial correlation.

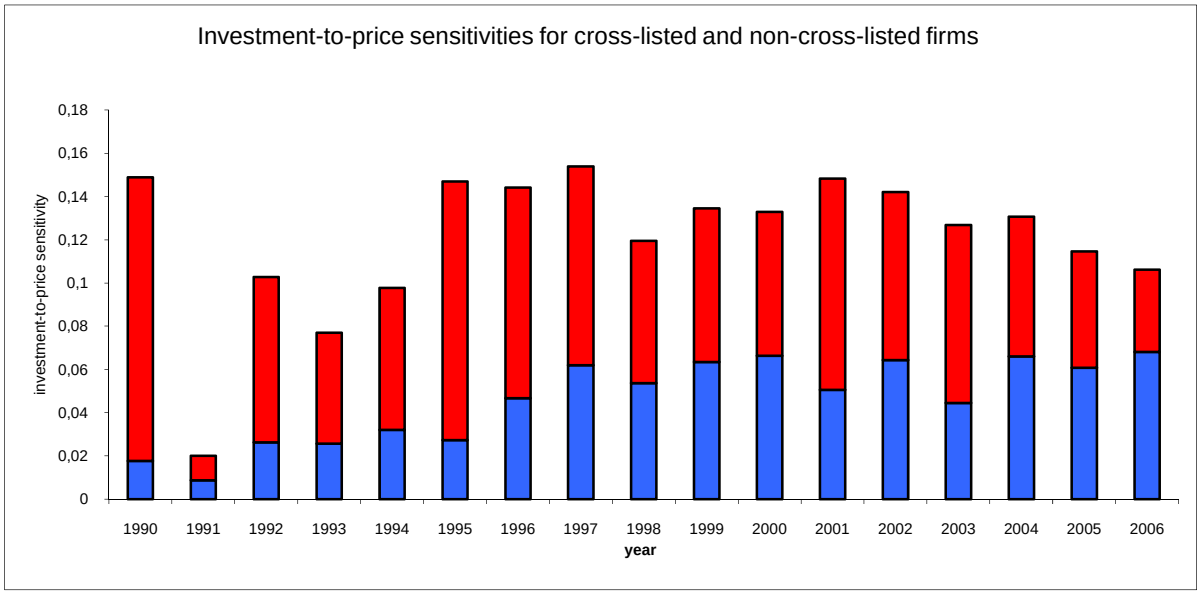

Figure 2: The effect of cross-listing on the investment-to-price sensitivity in event time

This figure reports results from an event-time analysis of the effect of cross-listing on the investment-to-price sensitivity. Specifically, we create a set of "event time" dummy variables where the event year (year 0) represents the cross-listing year for a given firm. We consider a window that comprises ten years before and respectively ten years after the cross-listing. Then, to track the evolution of the investment-to-price sensitivity around the cross-listing event, we re-estimate the baseline specification (1) in Table 3, but replace *Crosslist* by the set of event time dummies. This figure displays the coefficient estimates on each event-time dummy as well as their 95% confidence interval. The sample period is from 1989 to 2006. All estimations include country, year and industry fixed effects. The standard errors used to compute the confidence bounds are robust to heteroskedasticity and serial correlation.

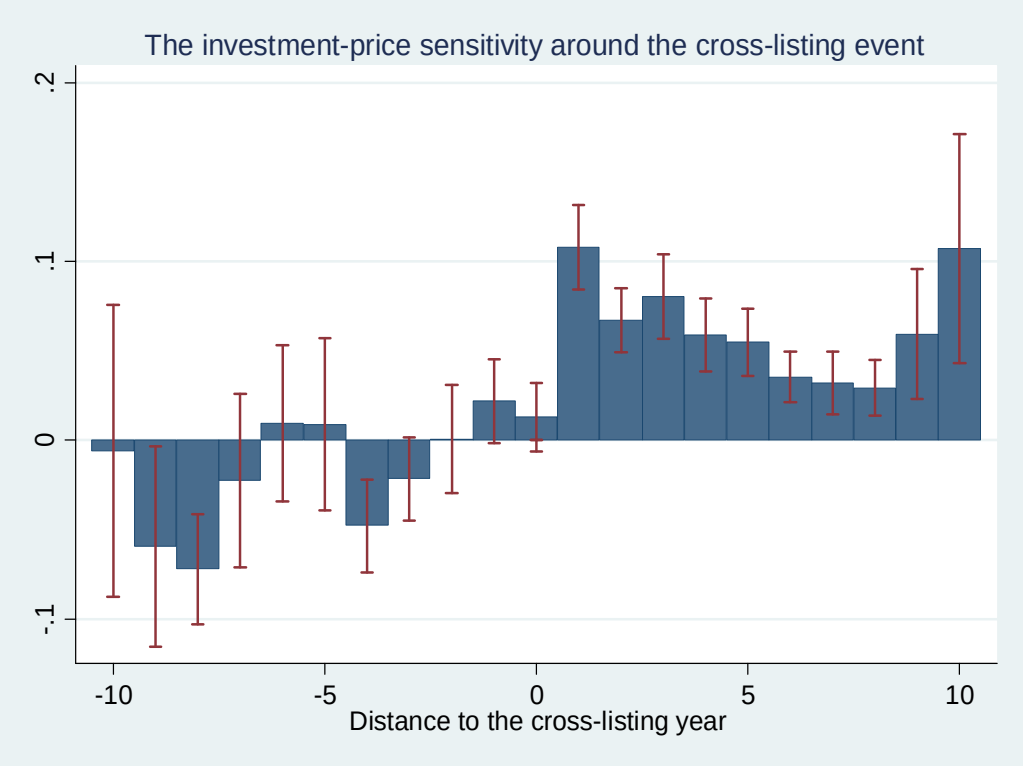

Table 1: Sample Description

This table describes the number of cross-listed and non-cross-listed firms in our sample classified by the country of origin. For each country, we report the number of firms and the number of firm-years available. Cross-listed firms are firms that are listed on a U.S. exchange (Level 2 and 3 ADRs and ordinary listings). The sample period is from 1989 to 2006. + denotes a country designated as an emerging market by Standard and Poor's Emerging Market Database.

	All firms		Non-Cross-Listed firms		Cross-Listed firms	
	Firms	Firm-years	Firms	Firm-years	Firms	Firm-years
Argentina+	70	498	63	421	7	77
Australia	938	4,959	915	4,765	23	194
Austria	122	994	121	988	1	6
Belgium	138	1,196	135	1,162	3	34
Brazil+	310	2,183	289	1,967	21	216
Canada	1,348	8,050	1,067	5,837	281	2,213
Chile+	138	1,271	125	1,102	13	169
China+	1,416	6,203	1,403	6,118	13	85
Denmark	186	1,795	182	1,744	4	51
Finland	162	1,465	156	1,412	6	53
France	998	7,515	966	7,148	32	367
Germany	853	7,114	829	6,891	24	223
Greece+	257	853	254	836	3	17
Hong Kong	718	4,907	707	4,819	11	88
Hungary+	36	237	35	228	1	9
India+	602	3,873	593	3,781	9	92
Ireland	89	729	80	645	9	84
Israel	157	799	96	495	61	304
Italy	316	2,479	307	2,376	9	103
Japan	3,820	28,335	3,790	27,918	30	417
Korea+	961	6,170	953	6,105	8	65
Mexico+	138	1,083	108	763	30	320
Netherland	246	2,163	211	1,861	35	302
NewZeeland	109	751	102	694	7	57
Norway	250	1,607	244	1,545	6	62
Peru+	71	463	69	439	2	24
Philipines+	133	992	130	952	3	40
Portugal	85	639	83	619	2	20
Russia+	53	187	47	153	6	34
Singapore	568	3,491	562	3,448	6	43
South Africa+	400	2,587	385	2,420	15	167
Spain	188	1,708	183	1,649	5	59
Sweden	356	2,537	343	2,398	13	139
Switzerland	244	2,264	236	2,186	8	78
Taiwan+	1,352	6,746	1,345	6,674	7	72
Turkey+	194	1183	193	1,177	1	6
UK	2,316	17,326	2,240	16,452	76	874
Venezuela+	21	145	18	116	3	29
All countries	**20,359**	**137,497**	**19,565**	**130,304**	**794**	**7,193**

Table 2: Descriptive statistics

This table reports the mean, median and standard deviation of the main variables used in the following analysis. All the variables are defined in Appendix A. We provide these statistics separately for all the firms in the sample, for cross-listed firms as well as for non-cross-listed firms. Cross-listed firms are firms that are listed on a U.S. exchange (Level 2 and 3 ADRs and ordinary listings). The sample period is from 1989 to 2006.

	All firms			
Variables	Mean	Median	Std Dev	Firm-year
Total Assets (TA)	1,577.666	206.007	7,357.145	137,497
Q	1.112	0.853	0.904	137,071
Capex/PPE	0.265	0.156	0.388	137,497
CF/TA	0.653	0.320	2.022	137,497
ψ	1.941	1.809	1.479	130,245
R^2	0.196	0.141	0.175	130,245
	Cross-listed firms			
Variables	Mean	Median	Std Dev	Firm-year
Total Assets (TA)	9,604.440	1,560.716	23,622.382	7,193
Q	1.525	1.123	1.214	7,170
Capex/PPE	0.290	0.196	0.363	7,193
CF/TA	0.440	0.341	1.758	7,193
ψ	1.924	1.803	1.497	6,790
R^2	0.199	0.142	0.179	6,790
	Non-Cross-listed firms			
Variables	Mean	Median	Std Dev	Firm-year
Total Assets (TA)	1,134.575	193.191	4,750.069	130,304
Q	1.089	0.842	0.878	129,901
Capex/PPE	0.264	0.154	0.389	130,304
CF/TA	0.665	0.319	2.035	130,304
ψ	1.942	1.809	1.478	123,455
R^2	0.195	0.141	0.175	123,455

Table 3: The impact of cross-listing on stock price informativeness

This table presents the results of OLS regressions of the effect of a U.S. cross-listing on firms' stock price informativeness. The baseline specification (column (1)) is similar to that of Fernandes and Ferreira (2008, p. 224). The dependant variable is firm specific return variation ($\psi_{i,t}$) and serves as a proxy for stock price informativeness. *Crosslist* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The control variables are the same as in Fernandes and Ferreira (2008) and are defined in Appendix A. The sample period is from 1989 to 2006. All estimations include country and industry fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Firm specific return variation ($\psi_{i,t}$)					
	(1)	(2)	(3)	(4)	(5)	(6)
Crosslist	0.114**	0.115**	0.137*	0.160**	0.161**	0,123
	[2.73]	[2.75]	[2.05]	[3.32]	[3.35]	[1.61]
log(MarketCap)	-0.032**	-0.032**	0,021	-0.032**	-0.032**	0,021
	[6.07]	[6.11]	[1.77]	[6.06]	[6.10]	[1.77]
LT Debt / Assets	-0,067	-0,069	-0,071	-0,065	-0,067	-0,071
	[1.31]	[1.35]	[1.15]	[1.28]	[1.32]	[1.16]
log(Book-to-Market)	-0.030**	-0.032**	0,024	-0.030**	-0.032**	0,024
	[3.33]	[3.52]	[1.68]	[3.33]	[3.52]	[1.68]
ROE	0,024	0,013	-0,027	0,024	0,013	-0,027
	[0.73]	[0.39]	[0.78]	[0.74]	[0.40]	[0.78]
Emerging				-0.516**	-0.512**	-0.498**
				[3.26]	[3.23]	[2.12]
Crosslist×Emerging				-0,171	-0,171	-0.058
				[1.91]	[1.91]	[0.37]
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	No	Yes	Yes
Year FE	No	No	Yes	No	No	Yes
# Firm-years	135,347	135,347	135,347	135,347	135,347	135,347
R^2	0.01	0.01	0.40	0.01	0.01	0.40

Table 4: The impact of cross-listing on the investment-to-price sensitivity

This table presents the results of regressions of the effect of a U.S. cross-listing on firms' investment-to-price sensitivity (equation (1)). The dependent variable is investment, defined as capital expenditures divided by lagged property, plant and equipment (PPE). *Crosslist* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The control variables are defined in Appendix A. In column (1), we provide baseline cross-sectional pooled OLS results. In column (2), we include firm fixed effects. In column (3), we use the Fama and MacBeth (1973) methodology to estimate equation (1). In column (4), we estimate equation (1) by including country random effects. In columns (5) and (6), we include only firms with total assets (*TA*) greater than 100$ mio and respectively $1000 mio. The sample period is from 1989 to 2006. All estimations include industry fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Investment (capex over lagged PPE)					
	Baseline	Firm FE	F-M	Country RE	TA>100$	TA>1000$
	(1)	(2)	(3)	(4)	(5)	(6)
Crosslist	-0.094**	-0.084**	-0.059**	-0.061**	-0.065**	-0.035**
	[8.08]	[4.11]	[5.54]	[7.00]	[5.62]	[3.09]
Q	0.064**	0.048**	0.055**	0.074**	0.058**	0.030**
	[34.39]	[19.20]	[7.95]	[68.57]	[21.62]	[5.62]
Q × *Crosslist*	0.072**	0.065**	0.064**	0.061**	0.056**	0.033**
	[8.22]	[5.88]	[7.63]	[12.06]	[6.51]	[3.61]
CF/TA	0.320**	0.433**	0.433**	0.319**	0.435**	0.517**
	[21.74]	[23.00]	[10.31]	[42.27]	[20.26]	[11.49]
log(TA)	-0.024**	-0.074**	-0.027**	-0.027**	-0.026**	-0.027**
	[25.20]	[16.75]	[10.67]	[45.56]	[21.40]	[10.48]
Country FE	Yes	Yes	Yes	No	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	Yes	Yes	Yes
Firm FE	No	Yes	No	No	No	No
# Firm-years	136,673	136,673	136,673	136,673	92,448	27,036
R^2	0.15	0.48	0.09	0.21	0.17	0.18

Table 5: The impact of cross-listing on the investment-to-price sensitivity (Robustness)

This table presents the results of various regressions of the effect of a U.S. cross-listing on firms' investment-to-price sensitivity (equation (1)) where we modify the definition of investment. In columns (1) and (2) investment is defined as capex divided by lagged, respectively contemporaneous assets. In columns (3) investment is defined as capex plus R&D expenses divided by lagged PPE. In columns (4) and (5) investment is defined as capex plus R&D expenses divided by lagged, respectively contemporaneous assets. Finally, in column (6) investment is defined as changed in assets divided by lagged assets. Across all specifications, *Crosslist* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The control variables are defined in Appendix A. The sample period is from 1989 to 2006. All estimations include country, year and industry fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Investment (various measures)					
	(1)	(2)	(3)	(4)	(5)	(6)
Crosslist	-0.019**	-0.010**	-0.186**	-0.019**	-0,005	-0.049**
	[5.54]	[4.09]	[4.39]	[4.18]	[1.51]	[4.36]
Q	0.007**	0.004**	0.175**	0.015**	0.010**	0.050**
	[15.43]	[11.52]	[26.26]	[22.57]	[20.14]	[28.15]
Q × *Crosslist*	0.012**	0.006**	0.244**	0.021**	0.011**	0.038**
	[4.75]	[3.59]	[6.11]	[6.27]	[4.51]	[4.14]
CF/ TA	0.159**	0.089**	-0.315**	0.123**	0.048**	0.867**
	[45.86]	[35.58]	[6.52]	[26.05]	[13.24]	[69.78]
log(TA)	-0.002**	-0.000*	-0.043**	-0.003**	-0.001**	-0.018**
	[9.50]	[2.20]	[21.57]	[10.10]	[3.05]	[29.31]
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
# Firm-years	142,228	142,228	136,673	142,228	142,228	154,770
R^2	0.22	0.2	0.17	0.2	0.17	0.23

Table 6: The impact of cross-listing on the investment-to-price sensitivity: self-selection

This table presents the results of the effect of a U.S. cross-listing on firms' investment-to-price sensitivity using the Heckman (1979) two-stage estimator. The first column reports the results of the (first-stage) probit estimation where the dependent variable *Crosslist*, a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The second column reports the (second-stage) OLS results of the baseline investment equation (1) where we add the *Inverse Mills Ratio* computed using the probit estimates. The dependent variable is investment, defined as capital expenditures divided by lagged property, plant and equipment (PPE). The variables used in both estimations are defined in Appendix A. The sample period is from 1989 to 2006. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Heckman	
	(First-stage) Probit	Second stage
Crosslist		-0.099**
		[4.72]
Q		0.062**
		[32.96]
Q × *Crosslist*		0.068**
		[7.56]
CF / TA	-0.611**	0.355**
	[9.17]	[24.25]
log(TA)	0.377**	-0.022**
	[69.19]	[21.09]
Debt / TA	-0.552**	
	[8.88]	
External Dependence	0.003**	
	[3.78]	
Sales Growth	0.035	
	[1.72]	
Median Industry Q	1.788**	
	[34.76]	
Foreign Sales / TA	0.868**	
	[30.11]	
Common Law	-0.114	
	[0.33]	
Country Market Capitalization	-0.432	
	[1.46]	
Inverse Mills Ratio		0.008
		[0.91]
Country, Industry and Year FE	Yes	Yes
# Firm-years	163,157	135,214
PseudoR2/R2	*0.38*	0.15

Table 7: Managerial learning and the impact of cross-listing on the investment-to-price sensitivity

This table evaluates the role of managerial learning on the positive effect of cross-listing on the investment-to-price sensitivity. The dependent variable is investment, defined as capital expenditures divided by lagged property, plant and equipment (PPE). *Crosslist* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The control variables are defined in Appendix A. Then we use five different firm-level variables that proxy for the degree with which cross-listed firms benefit from large informational gains upon cross-listing. Foreign sales measures the fraction of sales realized abroad. Inst.Holdings is the fraction of U.S. institutional holdings to total shares outstanding. U.S. trading is the fraction of trading that takes place on U.S. exchanges. U.S. Rel.Ind is the difference in the percentage of the market capitalization of a firm's industry located in the U.S. and the percentage of industry market capitalization for a firm's industry in its home country. Coverage refers to the average number of analysts issuing forecasts over a given year. For each of these five proxies, we construct dummy variables based on whether the proxies have above (*High*) or below median (*Low*) values. Then we interact *High* and *Low* with *Crosslist*. We report a F-test that evaluates whether the coefficients on $Q \times Crosslist \times High$ and $Q \times Crosslist \times Low$ are equal. The sample period is from 1989 to 2006. All estimations include country, year and industry fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Investment (capex over lagged PPE)				
	Foreign Sales	Ins. Holdings	U.S. Trading	U.S. Rel.Ind.	Coverage
	(1)	(2)	(3)	(4)	(5)
Crosslist	-0.065**	-0.013	-0.042**	-0.040**	-0.089**
	[4.91]	[0.92]	[3.37]	[4.80]	[6.87]
Q	0.064**	0.063**	0.063**	0.065**	0.064**
	[34.15]	[33.23]	[33.63]	[35.23]	[34.28]
$Q \times Crosslist \times Low$ (§)	0.050**	-0.001	0.020*	0.037**	0.073**
	[5.34]	[0.13]	[2.00]	[3.68]	[6.24]
$Q \times Crosslist \times High$ (¥)	0.083**	0.034*	0.039**	0.062**	0.042**
	[3.79]	[2.46]	[4.46]	[6.11]	[3.74]
CF/ TA	0.325**	0.335**	0.332**	0.320**	0.323**
	[21.78]	[22.06]	[22.20]	[21.74]	[21.75]
log(TA)	-0.023**	-0.023**	-0.023**	-0.024**	-0.024**
	[24.65]	[23.84]	[24.34]	[25.19]	[24.91]
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
# Firm-years	134,700	131,599	134,306	136,673	135,844
R^2	0.15	0.15	0.15	0.15	0.15
F-test: (§)-(¥) (*p*-value)	0.09	0.01	0.01	0.04	0.03

Table 8: Investment-to-price sensitivity and future performance

This table presents the results of various regressions of the effect of a U.S. cross-listing on firms' future performance. Performance is defined as one year ahead (three years ahead) return on asset (*ROA*) or sales growth (Δ*Sales*). *Crosslist* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. *Increase* (*Decrease*) is a dummy variable that equals one if cross-listed firms experience an increase (decrease) in their investment-to-price sensitivity after their U.S. cross-listing. Appendix B details the computation of these two dummy variables. The control variables are defined in Appendix A. The sample period is from 1989 to 2006. All estimations include year and firm fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Panel A: Next year Performance				**Panel B: Next 3-years Performance**			
	ROA		Δ*Sales*		*ROA*		Δ*Sales*	
Crosslist	0.020**		0.080**		0.013*		0.046**	
	[4.02]		[4.09]		[2.56]		[3.19]	
Increase (§)		0.037**		0.116**		0.018**		0.069**
		[6.27]		[5.01]		[3.14]		[4.25]
Decrease (¥)		0.01		0.058**		0.010*		0.032*
		[1.95]		[2.86]		[1.96]		[2.22]
log(TA)	-0.029**	-0.029**	-0.151**	-0.151**	-0.033**	-0.033**	-0.177**	-0.177**
	[25.32]	[25.33]	[34.93]	[34.93]	[29.45]	[29.45]	[50.79]	[50.81]
LT Debt / TA	-0.017**	-0.016**	-0.026	-0.025	0.027**	0.027**	-0.003	-0.003
	[4.18]	[4.09]	[1.72]	[1.67]	[7.30]	[7.33]	[0.32]	[0.28]
Cash /TA	0.064**	0.063**	0.128**	0.128**	0.035**	0.035**	0.170**	0.170**
	[10.89]	[10.85]	[5.58]	[5.56]	[6.55]	[6.52]	[10.83]	[10.80]
PPE /TA	-0.003	-0.003	-0.067**	-0.067**	0.014**	0.014**	-0.038*	-0.038*
	[0.48]	[0.47]	[3.01]	[3.01]	[2.79]	[2.79]	[2.15]	[2.15]
Firm and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Firm-years	169,568	169,568	170,378	170,378	124,799	124,799	126,545	126,545
R^2	0.55	0.55	0.33	0.33	0.74	0.74	0.6	0.6
F-test: (§) = (¥) (*p*-value)		0.00		0.00		0.02		0.00

Table 9: The impact of cross-listing on the investment-to-price sensitivity: Cross-country evidence

This table presents the results of regressions of the effect of a U.S. cross-listing on firms' investment-to-price sensitivity (equation (1)) separately for different groups of countries. The dependent variable is investment, defined as capital expenditures divided by lagged property, plant and equipment (PPE). *Crosslist* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The control variables are defined in Appendix A. We partition countries based on the following five variables: the Anti-self-dealing, disclosure and legal origin indices from Djankov, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2008), the GDP per capital and the market capitalization from the Worldbank. For each variable, we assign a country in the *Low* group if it has a value below the sample median and in the *High* group if it has value above the sample median. We estimate baseline investment equation (1) via a seemingly unrelated regression (SUR) system that combines the *Low* and *High* subgroups. The SUR estimation provides the joint-variance-covariance matrix that we use to construct F-tests to compare cross-equation restrictions. The sample period is from 1989 to 2006. All estimations include industry fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Quality of institutions						**Economic and financial development**			
	Anti-Self-Dealing		Disclosure		Legal Origin		GDP per capita		Market Capitalization	
	Low	High	Low	High	Code Law	Common Law	Low	High	Low	High
Crosslist	-0.049**	-0.111**	-0.048**	-0.111**	-0.055**	-0.110**	-0.069**	-0.094**	-0.047**	-0.103**
	[3.40]	[9.83]	[3.47]	[9.63]	[4.29]	[8.61]	[4.16]	[9.16]	[3.30]	[9.07]
Q	0.063**	0.063**	0.064**	0.068**	0.059**	0.064**	0.040**	0.069**	0.053**	0.069**
	[37.32]	[42.49]	[36.37]	[44.84]	[41.93]	[35.17]	[18.60]	[53.06]	[33.63]	[44.30]
Q × *Crosslist*	0.034**	0.085**	0.034**	0.087**	0.039**	0.087**	0.045**	0.073**	0.030**	0.081**
	[3.52]	[14.31]	[3.88]	[14.23]	[4.54]	[13.30]	[4.18]	[12.98]	[3.22]	[13.26]
CF / TA	0.410**	0.266**	0.361**	0.254**	0.470**	0.185**	0.574**	0.253**	0.450**	0.255**
	[34.09]	[26.98]	[29.75]	[25.24]	[45.43]	[16.08]	[39.22]	[28.56]	[38.37]	[25.33]
log(TA)	-0.019**	*-0.028***	*-0.023***	-0.025**	-0.017**	-0.037**	-0.015**	-0.025**	-0.017**	-0.030**
	[22.30]	[31.03]	[24.75]	[28.91]	[22.41]	[32.92]	[11.20]	[35.75]	[18.64]	[33.94]
Country, industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# Firm-years	66,490	70,144	63,660	66,353	89,642	46,992	34,496	102,138	64,331	72,303
R^2	0.18	0.13	0.16	0.15	0.17	0.13	0.14	0.16	0.16	0.15
F-test: *Low* - *High* (Q)	0.73		0.16		0.06		0.00		0.00	
F-test: *Low* - *High* (Q × Crosslist)	0.00		0.00		0.00		0.02		0.00	

Table 10: Cross-listing, the investment-to-price sensitivity and financing constraints

This table presents the results of regressions of the effect of a U.S. cross-listing on firms' investment-to-price sensitivity (equation (1)) for different sub-samples based on firms' dependence on external finance. The dependent variable is investment, defined as capital expenditures divided by lagged property, plant and equipment (PPE). Δ*Sales* is a dummy variable that is equal to one if the firm is cross-listed on a U.S. exchange, and zero otherwise. The control variables are defined in Appendix A. The sub-samples are based on quintiles of external dependence, which is the industry technological dependence on external finance based on Rajan and Zingales (1998). The first quartile (Q1) comprises firms from industries that do not rely on external finance, while the fifth quartile (Q5) comprises firms from industries that rely extensively on external finance. The sample period is from 1989 to 2006. All estimations include country, year and industry fixed effects. We report heteroskedasticity and serial correlation robust t-statistics in brackets. ** and * indicate statistical significance at the 1% and 5% levels, respectively.

	Investment (capex over lagged PPE)				
	Q1	Q2	Q3	Q4	Q5
Crosslist	-0.079**	-0.086**	-0.071**	-0.063**	-0.123**
	[3.03]	[4.19]	[3.83]	[3.21]	[7.26]
Q	0.054**	0.059**	0.048**	0.075**	0.071**
	[21.70]	[27.14]	[18.07]	[28.46]	[25.83]
Q × *Crosslist*	0.067**	0.062**	0.083**	0.060**	0.080**
	[5.31]	[5.96]	[6.51]	[4.88]	[8.21]
CF / TA	0.358**	0.263**	0.461**	0.385**	0.266**
	[18.82]	[16.59]	[27.27]	[22.72]	[15.86]
log(TA)	-0.024**	-0.017**	-0.017**	-0.020**	-0.038**
	[13.51]	[13.57]	[14.31]	[15.54]	[25.00]
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
# Firm-years	27,048	27,619	27,531	27,857	26,561
R^2	0.16	0.15	0.14	0.16	0.15