The role of segmentation and investor recognition through the lens of cross-listing activity

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Abstract:
We focus on the price effects occurring around cross-listing and examine whether the segmentation hypothesis is a relevant driver of price effects, whether the improvement in the information environment subsumes these effects, and to what extent changes in cross-listing activity from the home country of the underlying security impact both channels. Support for the segmentation hypothesis is limited to Emerging Market companies while the improvement in the information environment is the most important driver of the positive price effects for most of the companies in our sample. We also find that cross-listing activity prior to a firm's own listing has a significant impact. With more home country cross-listing activity, the benefits driven by the segmentation hypothesis decrease, while the influence of higher investor recognition on the price effects is heightened. More scrutiny and better information environment is associated to positive price effects with stronger economic significance in small-cap companies and in the presence of high agency cost, including for Emerging Market firms listing on US hosts.

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1. Introduction

Over the last two decades, financial markets have experienced tremendous changes in the path toward globalization with countries progressively removing explicit barriers to capital flows. Exchanges and companies took a large part in this move introducing country funds and cross-listed securities, eventually easing restrictions on international ownership. As a result, investors have gained access to an expanded choice of foreign securities in many trading venues, while opting for more internationally oriented investment strategies. Yet, the existence of several implicit investment barriers, such as differential information flows (Merton, 1987), liquidity discrepancies (Werner and Kleidon, 1996), different corporate governance frameworks (Coffee, 1999; 2002) or differential accounting disclosure requirements (Fuerst, 1998) still result in what we could call a non-indifference between domestic and foreign listing locations.

Companies that can overcome or mitigate market frictions by cross-listing on foreign markets are expected to experience positive price effects. While some authors still debate on the economic relevance of the price effect of cross-listings (Karolyi, 1998; Sarkissian and Schill, 2009), recent articles have identified a number of potential explanations for the positive stock market reactions (Lang et al., 2003; Doidge et al., 2004) and have disentangled the relative power of each of these rationales (Bris et al., 2007, Roosenboom and Van Dijk, 2009). However, given the dramatic increase of foreign listings on developed markets over the last two decades, the importance of alternative explanations for the price effect is bound to depend on the amount of cross-listing activity across countries and through time.

This paper investigates whether price effects around cross-listings are related to the degree of firms' segmentation prior to cross-listing and/or to the decrease in information

barriers occurring around cross-listing. We focus on these sources of explanation since both stem from theoretical models, international asset pricing under mild financial market segmentation (Errunza and Losq, 1985) and asset pricing under incomplete information (Merton, 1987). Foerster and Karolyi (1999) have already used a similar framework but revisiting this phenomenon can provide new insights, because of the large increase in cross-listings activity from the time of that article. Therefore our additional contribution is to uncover whether the price effects have differed for companies that have cross-listed at different times, since it is likely that these effects are linked to the extent of the existing cross-listing activity of any specific country prior to a company's own listing.

We derive a rigorous measure of a firm's segmentation prior to cross-listing from Errunza and Losq (1985) and investigate whether the abnormal returns around cross-listing are associated with this measure. The central hypothesis is that the impact of cross-listing on the value of a firm hinges on the potential to ex-ante replicate that firm's returns through host market-traded instruments. As a result, we use the correlation between an about-to-be cross-listed firm and securities traded on host-markets, a measure that is consistent with the extent of financial segmentation. Compared to unconditional market-wide correlation proxies, our firm-level diversification potential measure is less affected by the over-estimation bias documented in Errunza et al. (1999) and Carrieri et al. (2007), hence allowing us to more accurately infer the contribution of financial segmentation in the valuation benefits from cross-listing. In contrast with previous research, our estimate of the role of financial segmentation in the valuation effects is also time-consistent since it accounts for a firm's diversification potential prior to its cross-listing. Moreover, we fully account for home-country cross-listing activity that preceded a firm's cross-listing since we expect the benefits to change as more home-country securities become available on foreign markets through the years.

We also analyze the impact from analyst coverage, following Merton's (1987) asset pricing under incomplete information. Using foreign listings on NYSE and LSE, Baker et al. (2002) show that analyst coverage increases respectively by 128% and 48% in the year after cross-listing. Lang et al. (2003) similarly find supporting evidence of increased analyst coverage as well improvement in analyst forecast accuracy for a sample of cross-listings in the US. We also relate the positive price effects to the increase in analyst coverage. In addition, we conjecture that these effects will vary with cross-listing activity from the home country, as previous research such as Bae et al. (2006) has uncovered beneficial associations between a country's information environment and changes in openness.

Cross-listing studies are constrained by data availability in both the time-series and cross-sectional dimension. Indeed valuable information is often lost because firms lack price or other company information. In this study, we investigate the price impact for a hand-collected sample of 574 cross-listings of developed and emerging markets from 1982 to 2009 and relate it to the cross-listing activity of more than 1,500 companies. We are able to analyze this relation because our measure of cross-listing activity does not require price or other piece of information that commonly shrink datasets. Our analysis helps to determine whether the *segmentation hypothesis* is a relevant driver of price effects, whether the *improvement in the information environment* subsumes price effects coming from the diversification potential, and to what extent changes in cross-listing activity from the home country of the underlying security impact both channels.

Our results show overall support for both hypotheses. The investor recognition hypothesis better explains the abnormal returns of firms from developed markets, meanwhile the segmentation argument is highly supported for emerging market firms. We also find that cross-listing activity has a significant impact. Specifically, if there are more cross-listings from the same country, the benefits driven by the segmentation hypothesis are reduced. On the other hand, with higher cross-listing activity from the same country, the

influence of higher investor recognition on price effects strengthens. We also find that the association between abnormal returns and the investor recognition is heightened for companies that are more subject to imperfections in information, such as small-cap firms and firms with relatively weak corporate governance, including for emerging market firms that list on US hosts.

The rest of the paper is organized as follows: section 2 explains the data collection process, section 3 discusses abnormal returns, section 4 introduces the methodology and explains the construction of our main independent variables, section 5 presents the results. Section 6 concludes the paper.

2. Cross-listing activity and data

Cross-listing is a corporate decision to apply for a secondary listing of shares on an foreign exchange (host exchange). Cross-listing can be achieved through two generic ways: direct listing of shares as ordinary securities on the host exchange, or through a "Depositary Receipt" program, where the home-market equity shares serve as the underlying to a certificate or 'receipt' issued on the host exchange by a third party (the depositary bank). Depending on the legal requirements of the host exchange, the cross-listed company has then to comply with the host market's financial rules, observing either the same rules as domestic companies, or a set of rules specific for international companies. The cross-listing company is eventually either considered at par with domestic companies (e.g. *Level 3 cross-listing* on US exchanges), or with a specific international status (e.g. trading on the *international* segment for companies on the *London Stock Exchange*; exempted from reporting for *Level 2* US cross-listing).[1]

This paper builds on a large hand-collected database of 1,573 cross-listings from 42 developed and emerging countries, placed in five major international stock exchanges: US

[1] For an exhaustive survey of the institutional features of cross-listings, see Karolyi, 1998.

markets (NYSE, AMEX, Nasdaq), London Stock Exchange and Luxembourg Stock Exchange.[2] We collected data only on exchange-listed instruments: ordinary shares, *Level 2* and *Level 3* ADRs traded on US markets, and GDRs for other markets.[3]

No unique data provider exists for cross-listings. We therefore identified the candidates from on-line files maintained by *The Bank of New York/Mellon*, *Citibank Depositary Services*, *Deutsche Bank* and *JP Morgan*. These source files exhibit some survivorship bias, as the depositary banks delete from their records firms that delist.[4] This limitation is present in most cross-listing studies, but we strive to reduce it as much as possible by cross-checking with the sources. However, we have to acknowledge that our data sample is not totally free of survivorship bias.

Since part of our research question deals with the importance of cross-listing activity, we also look for possible delisting dates or dates of transfer to non-exchange-listed segments for all identified cross-listings. To determine whether a firm still has an active cross-listing, we systematically search the *Citibank* files, the host exchange websites, and examine the financial database data feed for the cross-listed security (*Thomson Datastream*).[5] Based on this set of information, we keep track of the chronological development of cross-listings from each country.

We study price effects using the cross-listing date as the event date (first trading day on the host exchange). As in many other studies, relying on announcement dates would substantially reduce the sample.[6] Cross-listing dates are retrieved from the depositary bank of the cross-listing firm and then cross-checked with other depositary banks, foreign

[2] Luxembourg Stock Exchange is one of the most popular host exchanges by emerging markets companies, like Indian companies. Foreign segment represented 87% of its total listings (domestic and foreign). Source: International Federation of Stock Exchanges, 2007.

[3] Cross-listings can also be *Over-The-Counter* instruments (Level 1 ADRs) or private placements reserved to qualified institutional buyers (Rule 144A ADRs / GDRs).

[4] Depositary banks provide some record of cancelled companies for which they were depositary but this history is very limited (approximately 4 years). Records from exchanges are also affected by similar bias, as exchanges only hold report current cross-listed companies.

[5] *Citibank* is the only depositary bank keeping track of historical information across all depositary banks. The others only provide a limited history of cancelled cross-listings for which they were depositary.

[6] Foerster and Karolyi (1999) document the median delay between announcement and listing to 44 days, with a negligible number of instances over 100 days. Based on cross-listing date as event date, this study will most likely capture the price impact in the pre cross-listing period.

companies files provided in CRSP and with on-line references published on host exchanges websites.[7]

Table 1, Panel A reports the distribution of identified cross-listings by home country (*identified sample*). We further group the data according to the type of capital market (developed, DM and emerging, EM) and the venue listing choice (US hosts and non-US hosts).[8] The largest population of identified cross-listings comes from U.K. (208), India (182) and Canada (169). Indian companies are also the most represented on non-US host stock exchanges (49% of the total number of cross-listings on non-US hosts), followed by Taiwanese and Russian firms. On US exchanges, the most represented countries for cross-listings are U.K. (207) and Canada (169), followed by Israel (109) and China (108). On the other hand, U.K. and China, together with Australia, have the lowest number of cross-listings on non-US exchanges. Overall we notice that western European companies tend to chose US host exchanges as their destination, while cross-listings from central and eastern European countries, together with EM firms, exhibit a preference for non-US stock markets.

Panel A of Table 2 highlights the large time window of our sample of identified cross-listings. The 1,573 identified cross-listing events span over a period of 75 years for companies from DMs (48 years for EMs). The majority of cross-listings are clustered over the period 1990-2009. We observe that the last decade has been more important for EM firms and non-US hosts, while the 1990-99 decade records the highest proportion of DM firms - listing on US exchanges.

To study price reactions around cross-listings, we require home market price data to be available for a full period of 24 months around the cross-listing week. We retrieve price data from *Thomson Datastream*. Only a subset of the identified sample (774 companies) has

[7] History from exchange factbooks is often limited. For instance, we were able to retrieve information from *LSE* from 1999 to 2009, while NYSE online factbook contains information about American Depository Receipts until 2003.

[8] The classification is based on MSCI indices, and it is dynamic through time (e.g. Portugal joins the developed market group in 1998). When MSCI does not provide information about the classification of a home market, we supplement with IMF data, although we acknowledge that IMF focuses on a country economy and not only on its financial market.

information on prices. Availability of analyst coverage puts another restriction on the identified set of cross-listings. We end up with a final sample of 574 studied cross-listings (*studied sample*). Panel B of Table 1 gives the distribution of this sample by country and listing location. The number of cross-listings dramatically shrinks for some countries because of availability of analyst coverage before the cross-listing (India), because cross-listings occurred a long time ago, implying low availability of both price and analyst data (Australia, Netherlands, U.K.), or because the identified cases contain a large number of cross-listings for which we cannot access prices (China) or find the underlying security in the home market (Israel). Overall, EM firms are most affected by the additional restrictions while Canada and U.K. remain the most represented countries. Panel B of Table 2 shows that not surprisingly the *cross-listing studied sample* starts later than the *identified sample*.[9] Cross-listings from DMs begin in 1982 while the earliest date for cross-listings from EMs is 1992. The period 1990-1999 still contains the largest portion of cross-listings.

At the end, the requirements on price and analyst data are causing the *studied sample* to shrink from the *identified sample* by about two thirds. Nonetheless we do use all the companies in the latter sample in constructing the cross-listing activity variable since it is likely that each cross-listing event can provide information about the development of the company's home capital market.

3. Price dynamics around cross-listings

3.1 Expected returns and evidence for cross-listings

According to theoretical asset pricing models under segmentation (Black, 1974; Stulz, 1981; Errunza and Losq, 1985; Alexander et al., 1987), financial securities affected by explicit barriers to investment are traded at a discount relatively to those accessible to all investors, due to an additional risk premium that provides compensation for imperfect

[9] Non-North American analyst data series starts in 1987. The North American data have sparse information starting in 1976 that begin to increase from the early Eighties.

international risk sharing. Cross-listing on foreign markets has been proposed as a way to circumvent financial segmentation (Stapleton and Subrahmanyam, 1977; Eun and Janakiramanan, 1986). Asset pricing models under investment barriers thus predict large positive returns during the liberalization period, leading to revaluation and a decrease in the company's cost of capital.

Early empirical studies of cross-listings investigated the segmentation hypothesis simply taking for granted the existence of barriers to investment preceding the listing. These studies report some evidence of pre-listing positive abnormal returns (run-up), post negative abnormal returns, and lower impact for Canadian companies, supporting segmentation (Alexander et al., 1988; Foerster and Karolyi, 1993; Jayaraman et al., 1993). Miller (1999) provides the first 'large scale' evidence, showing a 1.15% cumulative abnormal return over the three days window centered on the cross-listing announcement. With only US cross-listings, Miller's paper highlight higher reactions for exchange listings (*Level 2* and *Level 3 ADRs*) and for firms coming from EMs.

Similar conclusion can be drawn from Foerster and Karolyi (1999). They use a risk-adjusted market model with changing risk exposures to compute abnormal returns around the cross-listing dates and find a cumulative average abnormal over-performance in the year prior to cross-listing of 22%, and a cumulative average abnormal decrease by 13% after cross-listing. The patterns of price effects seem to vary depending on the destination markets, pointing to a higher effect for NYSE listings over other US listings. Errunza and Miller (2000) provide further evidence of the segmentation hypothesis, showing that the cost of capital tends to decrease by approximately 42% with respect to the steady state period pre cross-listing.

The decision of a company to cross-list not only affects explicit barriers to international investment by lowering or eliminating the foreign ownership restriction, but also influences implicit barriers, by improving the information environment and increasing investor

knowledge about the company. Merton (1987) theoretically relates the proportion of investors knowing about a firm to its expected return. The lower this awareness, the higher is the premium proportional to the idiosyncratic risk of the company, in addition to the market equilibrium return. Specifically, returns are shown to depend on a shadow cost of information, that is, a firm specific factor that depends on incomplete information.

Removing this imperfection should therefore bring a decrease in the pricing of the firm-specific risk in equilibrium. To the extent that cross-listing can increase investors' awareness towards the security, the pattern of price effects around cross-listing will exhibit abnormal returns linked to a decrease of shadow costs of information.[10] Foerster and Karolyi (1999) and Baker et al. (2002) find an association between improvement in investor recognition and revaluation patterns around cross-listings. Papers like Lang et al. (2003), Bailey et al. (2006), Fernandes and Ferreira (2008) document improvements in the information environment with cross-listings.

3.2 Risk adjusted returns

This paper considers the price effects over market equilibrium occurring with a cross-listing event. As cost of capital changes are difficult to measure, we concentrate on price effects taken as abnormal returns with respect to a risk-adjusted market model.

Table 3 reports summary statistics for realized returns and abnormal performance around cross-listing dates. Panel A has average excess returns for the cross-listing firms. We compute returns on a weekly basis, Wednesday to Wednesday. We use USD-denominated series when available, otherwise we convert prices in USD and compute returns in excess of the weekly rate of the 1-month US Treasury bill.[11] As it is common for this analysis in the literature, we compute average returns before listing (weeks -52 to -1), around listing (week

[10] Merton (1987) stresses the similarities of his analysis with the work of Errunza and Losq (1985).
[11] Exchange rates are retrieved from *Thomson Datastream*. We primarily use data from Global Treasury Information Service. When series from this provider are not available, we resort to data from WM/Reuters, Thomson Reuters or Federal Reserve Bank of New York. The 1-month T-bill series are retrieved from Prof. K. French online data library.

0) and after listing (weeks +1 to +52). The numbers reported in Panel A are means computed from the time-series averages of the cross-section of firms. The average weekly return for all firms is 0.45%. The returns are higher for EMs, in line with established facts and they are significantly different from the average returns of DM firms. The larger proportion of EM firms on non-US hosts explains the higher returns for firms on these venues. Looking at the distribution for the timing of listings, firms from the earliest decade show relatively lower average returns. The statistics for the listing week and after the cross-listing present a pattern in line with previous research, with negative average returns, and more so for firms from EMs.

To capture the abnormal performance from price effects, we estimate a market model for a two-year period centered around the week of cross-listing. Following Foerster and Karolyi (1999), our empirical methodology allows for changes in risk exposures since it is likely that the sensitivity of the company's returns to risk factors will change with the cross-listing event. We run the following regression for each company:

$$R_{i,t} = \alpha_{PRE,i} + \beta^{L}_{PRE,i} R^{L}_{t} + \beta^{W}_{PRE,i} R^{W}_{t} + \alpha_{DUR,i} D_{DUR,i,t} + \alpha_{PST,i} D_{PST,i,t} + \beta^{L}_{PST,i} R^{L}_{t} D_{PST,i,t} + \beta^{W}_{PST,i} R^{W}_{t} D_{PST,i,t} + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ are the weekly excess returns of the cross-listed security *i* in its home market, R^{L}_{t} are the weekly excess returns of the home market index of the security *i*, R^{W}_{t} are the weekly excess returns of the world market index, $D_{DUR,i,t}$ is an indicator variable that equals one in the week of cross-listing, $D_{PST,i,t}$ is an indicator variable that equals one for the 52-week period after the cross-listing week. Therefore, $\alpha_{PRE,i}$ is the risk-adjusted weekly abnormal return during the 52-week period before the cross-listing week (pre cross-listing period), $\alpha_{DUR,i}$ is the change in returns during the cross-listing week, $\alpha_{PST,i}$ is the change in risk-adjusted weekly abnormal returns during the 52-week period after the cross-listing week

(post cross-listing period). $\beta^{L}_{PRE,i}$ and $\beta^{W}_{PRE,i}$ are the exposures to local and world market returns in the pre cross-listing period, while $\beta^{L}_{PST,i}$ and $\beta^{W}_{PST,i}$ are the change in these exposures for the post cross-listing period. [12]

Panel B of Table 3 reports the cross-sectional average of the alphas from the firm regressions. We also include p-values for a test of significance on the mean coefficients and for a test of difference in means. For the whole sample, the estimate of 0.32% is statistically significant for the pre-listing period, but with a negative and significant mean coefficient in the post-listing period of 0.53%, the average weekly abnormal return is slightly negative. Our alpha estimates are remarkably close to the estimates of the pooled regression in Foerster and Karolyi (1999), although our sample also extends to cross-listings from later periods as well as firms from EMs. That paper also finds some differences among US exchanges, but such differences are not statistically significant. We also find no statistical difference between alphas of firms from US and non-US hosts, as well from DMs or EMs. Other authors have found similar patterns in abnormal returns around cross-listings using different methodologies and other risk adjustments (see Baker et al., 2002; Bris et al., 2007, Sarkissian and Schill, 2009; Fernandes, 2009).

4. Empirical methodology

This paper tests whether price effects around cross-listings are related to a decrease in investment barriers prior to cross-listing (segmentation hypothesis) and/or to a decrease in information hindrances occurring around the event (investor recognition hypothesis). We also want to determine whether these price effects are different for companies from the same country that have cross-listed at different times. Indeed, the importance of alternative

[12] We use country index total return series and world index total return series computed by *Datastream*.

explanations for the price effect is certain to depend on the amount of cross-listing activity from the home country that preceded a firm's cross-listing.

Section 4.1. explains our cross-sectional tests, and relate them with theoretical predictions. Section 4.2. and 4.3. explain how we obtain the independent variables for the tests.

4.1. Test of financial segmentation and investors' recognition roles for the price effect around cross-listing

The mild segmentation model of Errunza and Losq (1985) explains the additional risk premium due to frictions in international markets through the conditional covariance between a security and the local market portfolio, given all securities that are tradable by world market investors. This "super-risk premium" is then dependent on the degree to which company *i*'s returns can be mimicked by the set of securities accessible to all world investors. In the context of this model, a measure of the ability of global securities to span security *i* before listing is crucial to infer the extent of its segmentation. As measure of segmentation we use the correlation of the returns of each cross-listed company with a diversification portfolio obtained from the returns of other securities already traded before the listing week on global markets. The following section details the methodology to estimate such correlations.

Based on Merton's (1987) asset pricing model, incomplete information of investors implies pricing of idiosyncratic risk of the firm in equilibrium. The company's premium for the shadow cost of information is proportional to λ_i, a factor that depends on the aggregate risk aversion, the firm's idiosyncratic risk, its relative size and the proportion of the firms' investor base relative to the total number of investors. The change in the factor capturing the investor recognition is what matters for price effects.

Our analysis considers the abnormal returns from equation (1) as dependent variable. The most general regression specification that we estimate is:

$$\begin{aligned}\alpha_{PRE,i} = {} & \phi_1 + \phi_2 CORR_{DIV,i} + \phi_3 \Delta\lambda_i + \phi_4 \mathrm{GOV}_i + \phi_5 \mathrm{LIQ}_i + \phi_6 \mathrm{SIZE}_i \\ & + \phi_7 \text{CL-intensity}_i + \phi_8 \text{CL-intensity}_i \times CORR_{DIV,i} + \phi_9 \text{CL-intensity}_i \times \Delta\lambda_i + \upsilon_i\end{aligned} \quad (2)$$

where $\alpha_{PRE,i}$ represents price effects as abnormal returns from the estimation of equation (1) for each firm *i* in our *studied sample*, $CORR_{DIV,i}$ is the unconditional correlation of firm *i*'s returns with its diversification portfolio built from the companies in the *identified sample* and $\Delta\lambda_i$ is our measure of the change in firm *i*'s information environment. The interactions of these two main independent variables with *CL-intensity* account for conditional effects from the activity of the *identified sample* cross-listings that are active at the date of firm *i*'s cross-listing.[13]

A test of the importance of the segmentation hypothesis implies a negative and significant coefficient for ϕ_2. The correlation of firm *i*'s returns with its diversification portfolio before cross-listing, $CORR_{DIV,i}$, is an empirical assessment for the spanning of the company through global securities, consistent with the theory behind market segmentation. A higher correlation translates in less segmentation and a smaller price reaction upon cross-listing.

We test the hypothesis of a change in investor' information, proxied by an increase in analyst coverage, through the significance of the ϕ_3 coefficient. Based on the construction of the proxy, improvement in firm *i*'s information environment leads to negative $\Delta\lambda_i$. We thus expect a negative loading indicating that a larger price effect is associated with change in investors' awareness, in line with Merton's (1987) model.

The measure of cross-listing activity *CL-intensity* can offer additional insights on our two main hypotheses. First, consider the extent of cross-listing activity on the segmentation

[13] We follow Brambor et al. (2006) guidance on building interaction models.

hypothesis. Solnik (1974) was the first to show the additional diversification benefits from adding international assets, however we know from standard portfolio theory that such benefits are at some point eliminated. Errunza et al. (1999) also show that sequentially adding cross-listed instruments to a home-based portfolio decreases and then exhausts the gains from international diversification. We thus take into account the extent of cross-listing activity through the interaction of *CL-intensity* with $CORR_{DIV,i}$. As a result, we can more precisely assess the impact of correlation on the price effects and overcome constraints in data availability and methodology. With a positive correlation for almost all the firms in our *studied* sample, we expect the impact of the components of the interaction $\phi_2 + \phi_8 \times \text{CL-intensity}_i$ to be negative. That is, the price effects associated with low correlations are dampened by a higher level of cross-listing activity, as the diminishing conditional impact from the coefficient would indicate.

Now consider the impact of cross-listing activity for the investor recognition hypothesis. In global markets, two types of imperfections in information are likely at play, one at the firm level and one at the country level. That is, once we bring the Merton's framework of imperfect information to international markets, we expect that increase in investor's awareness will depend not only on the diffusion of firm specific information but also from the dissemination of information linked to the firm's home country. In other words, in global markets, the positive effects from additional analysts covering a company are likely to be larger if prior cross-listing activity has contributed to higher investors' awareness about the home country of the firm. Thus, for the investor recognition variable, the interaction with *CL-intensity* is intended to convey the impact at the country level from prior cross-listing events for which we have no complete analyst information in the *identified sample*. As $\Delta\lambda_i$ is negative for positive change in information, the conditional coefficient given by $\phi_2 + \phi_9 \times \text{CL-intensity}_i$ should become more negative. In other words, the price impact of $\Delta\lambda_i$ conditional on more cross-listing activity from the same home country is

expected to be heightened. Bae et al. (2006) can provide empirical support to our conjecture. They find that the information environment of a country improves with changes in openness like cross-listing events and that the contribution by analysts to the information environment increases after openness.

In summary, both hypotheses predict that price effects upon cross-listing should be positive. However, more intense cross-listing activity is likely to work in opposite direction, as we expect a decreasing impact from further decline in segmentation and an increasing impact from progressive improvement in the information environment. This in turn implies that although benefits accruing to cross-listings from the lowering of explicit barriers are significantly reduced, those related to implicit barriers still matter.

We construct *CL-intensity* using data from the *identified sample* in Panel A of Table 1 by computing the number of cross-listings from the same home country, active at the date of the firm's cross-listing. We view this variable as a time-specific assessment for each firm of the cross-listing activity of the home country at the time of its listing. Thus although the companies in the *identified sample* have no price or analyst information, they are nonetheless useful to construct the proxy. For example, even if we find pre or post listing only one or no analyst recommendation and exclude the company from the *studied sample*, we nonetheless retain the information about the listing of this company in the *CL-intensity.* Figure 1 shows a plot of the CL-intensity variable presented for each company based on its listing year. This variable has an mean (median) of 44.1 (33) across all the companies in the *studied sample*, with a value of zero for six companies from Hong Kong, Portugal, Colombia, Turkey, Switzerland and Sri Lanka that are the first cross-listing from their home country and a maximum value of 154 for an Indian company.

In our regressions, we control for potential influence of firm's size, liquidity, and corporate governance characteristics from firms' home country.

A growing body of literature has recently developed, attributing some of the positive effects documented for cross-listings to the "bonding" of companies to the standards of the host markets (see Coffee 1999, 2002). In the same vein, Stulz (1999) cites reduction of information asymmetry and of agency costs as important benefits linked to cross-listings. Doidge et al. (2004) also argue that bonding has an effect on valuations as it allows companies to better exploit their growth opportunities, with the help of the US corporate governance environment. The bonding hypothesis has also been used to explain decreases in the voting premium (Doidge, 2004), in the relaxation of capital constraints (Reese and Weisbach, 2002), in the firms' access to external financing (Lins et al., 2005). In general, these papers find it significantly at play for companies from EMs, with larger improvements associated with lower home country investor protection. Given the previous evidence, we want to control for the corporate environment of the home market. We include as control the variable GOV_i based on the Anti-Director Rights Index of Djankov et al. (2008) to capture the level of investor protection of firm *i*'s home country.[14] Based on the previous arguments, we expect a negative coefficient on this variable.

Another strand of literature finds evidence of liquidity improvements linked to cross-listing. Surveys like Mittoo (1992) underline access to deeper markets as the third major motivation for companies to cross-list. Indeed Foerster and Karolyi (1993) show that Canadian cross-listings in the US more than double their aggregate trading volume. Smith and Sofianos (1999) document a 38% average increase in the combined volume over the year following cross-listing. However a number of papers also find evidence of adverse liquidity effects for the cross-listed securities in the home market and for home market companies (Levine and Schmuckler, 2006, 2007; Domowitz et al., 1998; Fernandes, 2009). It is well documented that cross-sectional differences in liquidity have an impact on returns (Amihud and Mendelson, 1986; Acharya and Pedersen, 2005), and therefore we attempt to

[14] Djankov et al. (2008) revised Anti-Director Rights is an aggregate index of shareholder rights. It ranges from 0 to 6. The index is formed by summing: (1) vote by mail; (2) shares not blocked or deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a shareholders' meeting below 10%.

control for potential influences from liquidity in our cross-sectional tests. A few liquidity proxies exist in the literature but most of these measures are difficult to compute especially in an international setting as they require high-frequency data at firm level. We collect daily number of shares traded (volume) and outstanding number of shares for the home market security from *Thomson Datastream* to compute the daily share turnover ratio and average this ratio over the year preceding the cross-listing event.[15] Our liquidity proxy is thus a volume-based measure, the log of the average daily turnover ratio, LIQ_i=LN(1+$TURN_i$). Fernandes and Ferreira (2008) and Roosenboom and Van Dijk (2009) use analogous volume-based liquidity controls. Due to unavailability of volume data for some firms, the *studied* sample shrinks to a total of 519 cross-listings when we include liquidity control.

We also control for size as it is standard in the literature using the log of market capitalization averaged over the 52 weeks prior to the week of cross-listing ($SIZE_i$).

4.2. Proxy for segmentation

Empirical studies have relied on different approaches to measure segmentation for cross-listed companies. Many of the early studies simply divided samples for inference based on a priori classification.[16] Another approach has been to consider market-wide correlations between host and home markets as a proxy for the degree of integration (or segmentation) of the company (Sarkissian and Schill, 2009; Roosenboom and Van Dijk, 2009). However there are short-comings with such approaches. First, industries or segments of the same country can have different measure of integration with the benchmarks that are not captured by market-wide correlations (see for example, Carrieri et al., 2004). Furthermore, Carrieri et al. (2007) show that directly using market-wide correlations does not provide an

[15] We detect abnormally high turnover ratio for less than a dozen Brazilian companies, all but one being preferred shares. We manually screened each of these series. From the reconciliation of price data (adjusted and non-adjusted), number of outstanding shares and market value of the company, we determined that *Datastream* recorded the number of outstanding shares using a ratio of 1000 preferred share for 1 outstanding share of the company, so we adjusted the ratio accordingly.

[16] For example, Alexander et al. (1988) consider Canadian versus non-Canadian firms, Miller (1999) split their samples between firms coming from DMs or EMs.

appropriate measure of financial integration. In the same vein, Errunza et al. (1999) reveal that market-wide correlations overestimate the gains from investing in overseas markets. They further show that a better measure of the diversification potential is in the correlation of foreign indexes with a portfolio of US-traded instruments that most closely replicates the overseas index returns. Errunza and Miller (2000) also link the diversification potential of the foreign firm before the cross-listing announcement to the decline in its cost of capital.

We follow a similar approach and consider the correlation of the returns of each cross-listed company with a diversification portfolio obtained from the returns of globally traded securities before the listing week. The empirical construction of the diversification portfolios is similar to the approach in Errunza and Miller (2000) and in Carrieri et al. (2007). We use a two-step process to preserve degrees of freedom. We first run stepwise regression of weekly returns of the about-to-be cross-listed security, $r_{i,t}$, on the returns of the world market and ten global industrial indices (*Thomson Datastream* level 2-ICB-classification*)* in the 52 weeks before the listing week. We use forward and backward threshold criteria to retain those assets with the highest significant coefficients and obtain $\hat{r}_{G,i,t}$, the global diversification portfolio. We then regress $r_{i,t}$ on $\hat{r}_{G,i,t}$ and securities such as country funds and cross-listings from the home-country that are accessible to foreign investors prior to the cross-listing of security *i*. This set of securities can include some of the companies in our larger dataset of *identified* cross-listings (Panel A of Table 1) for which we only have price data on host exchanges and could not be part of our *studied* sample.[17] Due to the limited time-series of prices and in order to preserve degrees of freedom, we only account for up to three country funds and five cross-listings. We consider the older instruments first and if one of them is delisted, we replace it with the next closest in time. The fitted value from this

[17] Out of the 1,573 companies from Panel A, we have price information on host exchanges for 1,493 and we use these as candidates for the construction of the augmented diversification portfolios.

regression is the return on $\hat{r}_{ADP,i,t}$, the augmented diversification portfolio that is most correlated with the returns of security *i*.

The unconditional correlation of firm *i*'s returns with the returns of its own augmented diversification portfolio is the proxy for its segmentation ($CORR_{DIV,i}$). This correlation is an appropriate assessment of the potential for diversification at the firm level prior to cross-listing and is consistent with changes in investment barriers at the country level.[18] The lower the correlation, the higher the diversification potential, the higher the price effects from removing barriers to ownership restrictions. The variable $CORR_{DIV,i}$ may not fully consider the impact of additional securities because either our methodology is too parsimonious in accounting for all prior listings or because we have no home or host price data for some listings, especially the early ones. We remedy to these shortcomings in the main regression (2) with the help of the interaction with the *CL-intensity* variable.

Table 4 reports composition and statistics for the diversification portfolios. Panel A provides information across all firms on the global diversification portfolios and the augmented diversification portfolios. In constructing the global diversification portfolios, the step-wise selection procedure across all firms always picks the world markets index and 1.98 global industries. The average correlation of these portfolios with the returns of each firm is 0.48, ranging from 0.51 for the DMs to 0.43 for the EMs. Not surprisingly, the average correlation of each firm with its augmented diversification portfolio is substantially higher at 0.62. The vast majority of the firms has five preceding cross-listings in the augmented diversification portfolio, since the number of preceding cross-listings is 4.6 across all firms. Differently from the averages of the global diversification portfolios, there is not a lot of variation in the average correlation across subsets for the augmented portfolios. A two-sided t-test rejects that the global diversification portfolio correlations are equal between EM and

[18] As an empirical estimate of the degree of integration implied by the theory of mild-segmentation in Errunza and Losq (1985), Carrieri et al. (2007) use the square of the correlation between a country index and the return of its most correlated portfolio of global securities.

DM companies and between US hosts and non-US hosts listings, while it cannot find any statistical difference in the correlations for the augmented diversification portfolios within the same subsets.

Panel B of Table 4 reports information for firms aggregated across countries. It reports the date of the first cross-listing in the *studied* sample together with the date of the first cross-listing in our *identified* sample. In some cases, for example Hong Kong, these dates coincide, thus the diversification potential of the first cross-listing from this country in the *studied* sample is likely to be low as its diversification portfolio is constructed only from the 'global' securities. In other cases, such as Germany, the first cross-listing was preceded by the country fund. However, not all countries have a country fund, while in some countries the country fund preceded all domestic cross-listings (for example Korea or Mexico with three funds on average across all firms). In all cases except one, the correlations are positive reaching 0.98 for one company from Brazil. This panel reveals much more variation in the average correlations across countries and across listing periods. Similarly to what is documented at the market level in Errunza et al. (1999) some firms from DMs have higher correlations in the first decade. In the Eigthies, the correlations with the global diversification portfolio for many of these companies are relatively higher because of the large weight of developed market firms in global industry indices. Differently from this earliest period, most firms of the *studied* sample that listed in the 1990-99 decade only had a few cross-listings from the same country that were already trading on host markets. As a result, average correlations are generally the lowest across all of the sub-periods, including among the subset of Developed Markets. The pattern across sub-periods indicates an overall increase in the correlations in the latest decade for EM firms. This is consistent with a lowering of explicit barriers during the Nineties, resulting in a general decrease in segmentation.

We use a liquidity based criteria as alternative to seniority for the selection of the five globally available securities. We rank previous cross-listings as candidates for the augmented diversification portfolio on the percentage of zero daily returns and pick the first five most liquid securities. In around 20 percent of the cases, we end up with the same augmented diversification portfolio and for the rest 80 percent we do not find a pattern that can be attributed to a persistent bias. We thus present results based on the seniority criteria.

4.3. Proxy of the change in information environment

Following Kadlec and McConnell (1994), we define the change in the incomplete information for each firm as:

$$\Delta\lambda_i = \sigma_{\varepsilon i}^2 RMV_i \left(\frac{1}{A_i^{PST}} - \frac{1}{A_i^{PRE}} \right) \qquad (3)$$

where $\sigma_{\varepsilon i}^2$ is the residual variance of firm *i* from equation (1), RMV_i is the ratio of the market value of firm *i* to the world market value on the date of cross-listing.[19] For the A_i, we follow Baker et al. (2002) and rely on analyst coverage rather than the number of shareholders. This allows us to use a larger sample of companies, and avoid possible biases due to accounting manipulations. A_i^{PRE} (A_i^{PST}) is then the cumulative number of analysts following the company during the twelve months prior to cross-listing (after cross-listing, excluding the cross-listing week).[20]

The use of analysts is also motivated by the information structure postulated by Merton, where complete information will be achieved when there is sufficient number of intermediaries to disseminate information about the firm. Analyst coverage is therefore a sensible proxy for the assessment of the change in the information environment of the firm.

[19] The market value of the cross-listed companies and of the world index is extracted from *Thomson Datastream*, converted in USD.
[20] We follow Kadlec and McConnell (1994) for the construction of our empirical proxy and neglect the aggregate risk aversion factor.

The analyst coverage data is retrieved from detailed files of the I/B/E/S database, both North-American and international files. We consider the cumulative number of brokers issuing at least one forecast for 1-year EPS of the company during the 12 months prior and after the cross-listing date, excluding the cross-listing week. We rely on brokers rather than analysts, given that analysts would cause misidentification problems.[21] Only cross-listed companies whose visibility measure is computable are included in our sample, i.e. firms that have coverage of at least one broker for both pre and post cross-listing period.

The statistics of our collected datasets yields results that are overall in line with the findings in Baker et al. (2002). Table 5 reports statistics and univariate analysis for the analyst coverage measure. We present mean and median of the number of analysts for each company during the pre and post cross-listing periods together with univariate tests of changes in the measure. The paired two sample t-test for the mean and the non-parametric Wilcoxon signed rank test for the median are testing for an increase in analysts in the period after cross-listing relatively to the period before. Panel A reports statistics and tests for the whole sample, while Panel B presents them for each country.

Panel A of Table 5 shows that analyst coverage increases in the post listing period. This increase is significant at any statistical level based on both statistics for the whole sample, for the sub-periods and for the partitions based on type of capital markets or host exchanges. For the full sample the mean increases from 14.5 to 17.4. The increase is relatively larger for EM firms (28%) versus DM firms (15.5%) and for non-US host (31.2%). When looking separately at pre and post listing level of analyst following, the univariate tests indicate that EM firms on US hosts have larger analyst following than EM firms listing outside the US in both periods, but find no statistical difference between the two groups in the change in analysts following. Considering the different decades, companies that cross-listed in the 1990-99 decade have higher level of analysts coverage, but companies in the first decade

[21] Analyst identification codes may refer to a sector rather than to a given person (especially for international recommendations), or the analyst name can be 'undisclosed' by the brokerage firm and therefore coded as "0".

show the largest percentage increase. Companies cross-listing in the latest decade show the smallest percentage change across all partition, thus the increase in the post-listing periods cannot be attributed to expanded data coverage by I/B/E/S in the latest years.

Panel B reports the change in analyst following, organized by home country of the *studied* sample firms. Mean and median figures in this panel are also supporting the evidence that analyst following generally increases upon cross-listing. However we do find instances with lower mean and median after cross-listing, for example for firms from New Zealand, Sweden, Brazil and Poland. None of the instances of decrease in the number of analysts is statistically significant, in contrast to the vast majority of the increases. Also, only four countries show no change in the average number of analysts across firms, Spain, Philippines and Sri Lanka.

5. Results

5.1 Main results

Table 6 presents results of cross-sectional regressions from six different models. For all models, the dependent variable $\alpha_{PRE,i}$ is the abnormal returns estimated for the period before cross-listing from the two-factor model in equation (1). In each case, we report coefficients and statistical significance computed from robust t-statistics with White standard errors corrected for heteroskedasticity. The set of observations for these regressions is the *studied* sample of Panel B in Table 1 with 574 cross-listings. However the cross-section is pared down to 519 observations in four models due to data availability for the control variables.

The first regression includes as independent variable a measure of the diversification potential offered by the underlying security, which is consistent with its segmentation. The coefficient on $CORR_{DIV,i}$ is negative and significant at any statistical level, indicating that abnormal returns are higher when the correlation between the underlying security and its

most correlated portfolio of global securities is low. Model (2) is as parsimonious as the first one and includes only the proxy for the change in firm *i*'s shadow cost of information, $\Delta\lambda_i$ as independent variable. The parameter estimate on the change in investor' recognition is -0.114 and significant, supporting Merton's incomplete information hypothesis. The negative sign is an indication that firms with larger changes in analysts following, i.e. those firms with higher shadow cost of information in the pre-listing period, experience positive price effects. The constant is positive and significant and the R^2 is higher for the second model (1.95% versus 1.23%).

In model (3) and (4) we add controls for liquidity and size at the firm level and for corporate governance at the country level to model (1) and (2) respectively. The sign and significance of coefficients for both $CORR_{DIV,i}$ and for $\Delta\lambda_i$ in the two separate regressions are still negative but only the investor recognition remains significant. The sign of the coefficient on liquidity varies across specifications, although it is never significant. Given the mixed evidence in the literature on liquidity effects and the challenges in measurement, this result is not surprising. The sign on the control variable for corporate governance is positive, while we would expect higher price effects for firms with lower protection of shareholder rights, however the coefficient is not significant. The coefficient on size is negative and very significant, as in some other previous papers on cross-listings (see for example Baker et al., 2002, Bris et al., 2007). Model (5) considers all the independent variables discussed above as explanatory factors and confirms the sign and significance of the main variables. With an adjusted R^2 of 10.39 percent of the variance of the dependent variable, the specification provides a reasonably good explanation for the estimated abnormal performance. As a comparison, Foerster and Karolyi (1999) and Baker et al. (2002) present an R^2 in the range of 0.2% and 4% in comparable specifications.

Overall the results of model (5) provide strong support to one of the two hypotheses under investigation, relating the price effects around cross-listings to the decrease in

information barriers occurring around the event. The relation between the price effects and the firm's potential for diversification prior to cross-listing is statistically strong in the univariate model (1) and disappears in the multivariate analysis because of the control for firm size. Since our methodology by design will generate higher correlations for the larger companies more exposed to global factors, our control for size is highly correlated with the diversification measure and picks up a lot of the cross-sectional variation in the full sample of *studied* cross-listings. This finding is not surprising given the evidence in Eun et al. (2008) who show how the benefits from international diversification can be enhanced by the addition of small-cap stocks that are driven by more local and idiosyncratic factors.

Our analysis so far has uncovered a general association across the cross-section of securities but has not captured other effects linked to the timing and the volume of cross-listings within a country. It is conceivable that the impact of the proposed explanations could depend on the amount of home country cross-listing activity that preceded a firm's cross-listing. Consider one of the companies in our *studied* sample that has cross-listed in the late Nineties. At the same level of diversification, the impact on prices should be smaller if there is a large number of preceding cross-listings from the home country that cannot be properly accounted for in our diversification portfolio. In the same vein, for the same change in shadow cost of information, the price impact should differ from that of another company if there is already a substantial number of preceding cross-listings from the same country. In other word, by estimating only an average association between the variables, we cannot fully discriminate the effect of the prior listings from subsequent ones at the same level of the independent variable.

Model (6) expands our analysis in this direction. We investigate whether the association between the variables varies depending on the level of cross-listing activity already present for the home country of the underlying security. This approach can provide a time-specific assessment linked to country-level characteristics for each firm.

Together with the variables and controls of model (5) we include interaction with the *CL-intensity* for both $CORR_{DIV,i}$ and $\Delta\lambda_i$. With the help of the interaction variable we can uncover how the association changes with different level of cross-listing activity from the *identified sample*, even though we have no price or analyst information on these companies. Under model (6) we report the estimated coefficients with significance associated to the standard t-statistics. In addition, below in the same table we also report the value of the estimated coefficient of the interaction in model (6), evaluated at quantiles and at the average of the distribution of *CL-intensity.* It is indeed difficult to properly evaluate the conditional hypothesis using only the information that is regularly provided in result tables. Table 6 remedies to these short-comings and reports values for the interactions that measure the marginal effects of our two main independent variables when conditioning on the level of cross-listing activity. We also include the statistical significance over the range of the conditioning variable.[22]

The results of the conditional model provide more support to the segmentation channel. The ϕ_2 coefficient that measures the effect of diversification at zero *CL-intensity* is positive but not significant and it is decreasing with more prior cross-listings, turning negative and significant at the high range of the *CL-intensity* measure. With a positive value for the independent variable, an increasingly negative conditional impact implies that the association that we uncover between the correlation and the price effects is dampened at higher values of *CL-intensity*. Thus, as cross-listing activity expands, the diversification benefits that additional cross-listings can provide are decreasing. Lee (2004) cannot find in his dataset of 63 cross-listings that early announcement returns are significantly different from later announcement returns, which would be indication of the importance of the segmentation hypothesis. However the analysis in that paper is not using any specific proxy

[22] P-values are obtained from t-statistics with standard errors calculated from the components of the marginal coefficient, that is $\hat{\sigma}\left(\frac{\partial \alpha_{PRE,i}}{\partial CORR_{DIV,i}}\right) = \sqrt{\text{var}\left(\hat{\phi}_2\right) + \text{CL-intensity}_i^2 \,\text{var}\left(\hat{\phi}_7\right) + 2\,\text{CL-intensity}_i \,\text{cov}\left(\hat{\phi}_2, \hat{\phi}_7\right)}$ and similarly computed for $\Delta\lambda_i$ with $\hat{\phi}_3$ and $\hat{\phi}_8$.

for segmentation. Our findings are more in line with results from Sarkissian and Schill (2009) suggesting that the first cross-listing is associated with unique transitory valuation effects. It is also consistent with the general increase in integration documented in the literature, such as in papers like Fernandes (2009) that shows that each additional cross-listing further integrates the market, although the early ones have stronger impact.

We are also interested to see how preceding cross-listing activity from the home country of the underlying security modifies the association between investor recognition and the price effect. The interaction of $\Delta\lambda_i$ with *CL-intensity* addresses this issue. The reported values for this interaction range from -0.1356 to -0.8027. Since the $\Delta\lambda_i$ is negative for bigger changes in the shadow cost of information, the negative conditional relationship implies that larger price effects are associated with improvement in information imperfection due to more home-country cross-listings. The conditional coefficient is statistically significant over the whole range of the conditioning variable. This result is supporting of the view that firm level information is enhanced with more prior cross-listing activity. We see this as indication that in global financial markets, improvement in investors' awareness can be achieved by a combination of firm-level and country-level dissemination of information.

The R^2 of model (6) at 14.94 percent is almost 1.5 times the R^2 of the corresponding linear-additive model (5). Thus with more cross-sectional variation through the *CL-intensity* variable, we can substantially increase the explanatory power of our model. The information conveyed by the firm-level variables that we use in model (1) to (5) can be enhanced by conditioning on characteristics that are common across the country of origin.

Given the acceleration of cross-listing activity throughout the years, a possible concern is that the CL-intensity variable or its interactions could be picking up a general trend in the abnormal returns. We thus run a check with our *studied sample* by regressing the cross-section of the $\alpha_{PRE,i}$ against time dummies for the listing year. Some of the dummies for

years in the Nineties are positive and significantly different from zero but we cannot find any specific pattern in the estimated coefficients that could translate into a sustained trend. Over the three decades we find periods with higher estimated abnormal returns on average, followed by periods where the estimated average abnormal returns decrease. This leads us to conclude that the patterns in the interactions are not simply capturing a time-trend.

5.2 Extensions

The results so far seem to indicate that the investor recognition hypothesis is more important. To refine our understanding, we extend the analysis in a number of directions. We look at possible differences due to the country of origin, the listing location, the size of the company and the level of corporate governance. The results are in Table 7. We only report the additive models (3) and (4) with each of the independent variables and the controls, plus the interaction model (6) with the schedule of the *CL-intensity* distribution.

We start by running regressions that include Emerging Market companies listing on all hosts. Results are in Panel A of Table 7. We observe that while the coefficients on our two main independent variables in the additive models (3) and (4) are of the expected sign, only the one for the segmentation hypothesis is significant. The multiplicative model (6) reinforces the conclusion on the importance of correlations but also shows that its impact decreases in size for the whole range of the CL-intensity conditioning variable. Our conjecture that the impact of prior cross-listing activity would dampen the benefits is strongly supported within this subset. With respect to the other hypothesis, model (6) reveals that by conditioning on previous listings from the home country, the association with the investor recognition becomes marginally significant over the high range of the interaction variable. As Emerging Market companies represent the largest proportion of companies listing on non-US hosts, they also allow us to investigate differences among listing venues. We thus repeat the analysis eliminating the EM firms that list on US hosts. For the

remaining 104 companies, the segmentation hypothesis appears to be the only driver as we find no significant unconditional or conditional association with the variable for the information hypothesis. We infer that adding the EM firms listed on US hosts strengthen the statistical importance of the recognition hypothesis. Indeed non-tabulated results of model (6) indicate that while the relation among the companies in this subset is not statistically significant, nonetheless the impact of visibility is increasing with prior cross-listings.

Overall the evidence from Panel A of Table 7 shows that positive price effects for EM companies are related primarily to a decrease in investment barriers. As it also reveals that EM companies listed on US-hosts add explanatory power with respect to the information channel. Panel B and C of Table 7 concentrate most of the analysis on companies from emerging and developed markets listed on US hosts.

We analyse a different breakdown by splitting the sample based on the market capitalization of the company. The literature in domestic setting has found evidence that visibility of large companies is higher than that of smaller ones and the international finance literature has also stressed the importance of size in relation to analyst following (see for example Lang et al., 2003). Other studies argue that in Japan foreign investors prefer large stocks (see Kang and Stulz, 1997; Edison and Warnock, 2004), and that institutional investors around the world prefer stocks of companies that are large and widely held (Ferreira and Matos, 2008). The control for size is significant with a negative sign within the full sample of firms in Table 6. Since cross-listing is more common among large capitalization company, abnormal price effects are higher for relatively smaller companies that are less expected to cross-list.

In Panel B of Table 7 we present results for US listing firms within the bottom and top three deciles from the distribution of market capitalization at the time of cross-listing from all firms. The coefficients for $\Delta\lambda_i$ are negative in models (4) for both subsamples but

significant only for the large size companies. This is somewhat puzzling as large firms should benefit the least from cross-listing. The difference is confirmed also in the interaction model (6). For the large companies the information environment is statistically significant and its importance is increasing with prior cross-listing activity. However, we find interesting insights in the regressions with the small size companies. For this subset, the coefficient is much larger in size, varying from -0.544 to -1.257 over the range of *CL-intensity*, and when marginally significant at the average of the distribution, it is more than double the size of the corresponding coefficient of the large companies (around 50 average cross-listings in both subsets). We interpret these results as indication that improvement in information is more important in economic terms for small-cap companies that have higher shadow cost of information and likely to be less known to investors. In other words, the price effects from decrease in information imperfections are heightened for small size firms, especially through the impact of more cross-listing activity at the country level. We also run the same regression with only the EM listings. While we cannot find significance among the 36 companies comprising this subsample, we observe that for the same level of CL-intensity the coefficient is 4 times larger than the value of the $\Delta\lambda_i$ interaction for the subset of 124 companies reported in Panel B. As in Panel A, the EM firms listed on US hosts help strengthening the evidence on the information channel.

The variable that controls for the bonding hypothesis is at times of the right sign but significant only in Panel A. Yet, there is mounting evidence in the literature of positive effects for cross-listing companies stemming from reduction in agency costs and information asymmetry in a superior information and legal environment. To investigate its importance in relation to the investor recognition hypothesis, we look at the subsamples of companies that score below and above the median with respect to the ranking in the anti-directors-rights index of the home country, taken from Djankov et al. (2008). Only results for companies below the median of the index are tabulated as these are companies with higher frictions and

thus can provide some insights in the comparison with the subsets of companies in Panel A and Panel B. We present evidence for the US hosts where the subsample is comprised of DM and EM firms, as in Panel B, and then for all hosts where we include also the EM firms listing outside the US, as in Panel A.

The analysis in Panel C for US listings reveals quite a different pattern from the results of Panel B. For the companies below the median of the governance index the coefficient in model (4) is similar in size to the one for small companies but this time is significant and, most importantly, its economic impact strengthens in the interaction model (6). This suggests that the benefits from the information environment channel are heightened where the need for stringent disclosure standards and greater transparency is the largest. Across the two subsamples of companies below the median in Panel C, the coefficient for investor recognition is negative and significant in the additive regression (4) on both US hosts and no-US hosts, yet the insights from the conditioning model are quite different. Combining all the companies from country with poor corporate governance does not strengthen the results, as we gain no additional information from the conditioning model. As it is the case for Panel A, the channel from improvement in information works differently for EM companies on US hosts and those on non-US hosts.

In summary, US listed companies that are large, from developed markets and from countries with good corporate governance are driving the results on the investor recognition, as we find within these subsets coefficients that are similar in size and significance to those in Table 6 with the whole sample.[23] EM companies are driving our results for positive price effects through the segmentation channel. Yet, we find evidence that price effects for EM companies listing on US hosts are associated also with the information channel. Piotroski and Srnivasan (2007) offer similar insights in identifying a set of EM companies that listed on a US exchange despite being predicted to list in London, consistent with large, high

[23] Most of the results within subsets that are in line with the evidence of Table 6 are not tabulated but available from the authors.

quality firms from countries with weak investor protection. They suggest that these companies are being drawn to the US by the enhanced bonding benefits, an indication that the signal as a high quality firm is stronger on US markets. Within our sample, more scrutiny and better info environment is associated to positive price effects with stronger economic and statistical significance in the presence of high agency cost, and EM firms listing on US hosts help in establishing this result.

6. Conclusion

Cross-listing is a policy decision with far reaching effects that finds in part its motivation in market frictions. We investigate to what extent the decrease in international market frictions –market segmentation– and the decrease in information frictions –investor recognition– are drivers of price reactions around cross-listings. We further study whether these effects are heightened or dampened by the level of home-country cross-listing activity that preceded the cross-listing event of a company. Thus we complement explanatory variables that are firm-specific, such as diversification potential and changes in the shadow cost of information, with a time-specific determinant of cross-listing intensity computed at the country level.

For a sample of 574 cross-listings between 1982 to 2009 on US and non-US stock exchanges, we find support for both the segmentation and the investor recognition hypothesis. In line with our expectations, the driver of price effects around cross-listings for emerging market firms appears to be predominantly related to the segmentation hypothesis. On the other hand, consistent with previous evidence on the quality of the information environment, developed market and large capitalization firms experience price effects that are only supported by the change in their information environment. Furthermore our evidence suggests that when we also account for the activity of more than 1,500 cross-listings across countries and years, we find that the segmentation hypothesis is weakened by

more prior activity, as the diversification potential is eventually exhausted. Conversely, the conditional effect on the increase in information from country-level cross-listing activity is heightened also for smaller companies and EM companies with relatively weaker corporate governance that list on US hosts. However, higher investor awareness in combination with more cross-listing intensity does not lead to beneficial price effects for EM companies listing on non US hosts.

Despite becoming less innovative, the decision of a company to cross-list can to these days have beneficial effects that are associated with improvements in the information environment, also linked to more intense cross-listing activity from the home country. Our evidence seems to suggest that such policies reach beyond the company itself and can contribute to enhancements at the country level.

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http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

TABLE 1: Sample composition by home country

This table presents the number of cross-listings by home country and given exchange location (host market) being a US exchange or not. All cross-listings included in the sample are exchange listed. Panel A presents all *identified* companies (from home countries corresponding to the countries of the studied companies). The *identified* cross-listings set serves as the basis for the construction of CL-intensity$_i$, the number of cross-listings originating from firm *i*'s home country, existing prior to firm *i*'s cross-listing date and active in the week of firm *i*'s cross-listing. The *identified* cross-listings set is the basis for the identification of cross-listings included in the augmented diversification portfolios, subject to availability of price data for the cross-listed security in the host market. Panel B presents the *studied* companies, subset of the sample in Panel A subject to availability of home-exchange price data and analyst following for 24 months around cross-listing date (see data description in Section 2).

	Panel A: *Identified* Cross-Listings			**Panel B: *Studied* Cross-Listings**		
Home Country	All Firms	US-hosts	Non-US hosts	All Firms	US-hosts	Non-US hosts
ARGENTINA	26	22	4	10	10	
AUSTRALIA	47	46	1	20	19	1
BELGIUM	5	5		3	3	
BRAZIL	54	52	2	30	30	
CANADA	169	169		98	98	
CHILE	28	28		18	18	
CHINA	109	108	1	2	2	
COLOMBIA	3	3		2	2	
CZECH REPUBLIC	6	1	5	2		2
DENMARK	4	4		3	3	
FINLAND	8	8		6	6	
FRANCE	43	41	2	18	18	
GERMANY	37	37		17	17	
GREECE	20	17	3	5	4	1
HONG KONG	21	21		5	5	
HUNGARY	8	2	6	2		2
INDIA	182	18	164	71	13	58
IRELAND	32	32		8	8	
ISRAEL	111	109	2	7	7	
ITALY	21	21		8	8	
JAPAN	41	41		10	10	
KOREA	33	18	15	8	2	6
MEXICO	52	52		14	14	
NETHERLANDS	39	37	2	9	9	
NEW ZEALAND	10	10		2	2	
NORWAY	18	18		6	6	
PAKISTAN	5		5	2		2
PERU	4	4		2	2	
PHILIPPINES	8	5	3	1		1
POLAND	11	1	10	2		2
PORTUGAL	4	4		1	1	
QATAR	2		2	1		1
RUSSIA	42	7	35	4		4
SOUTH AFRICA	29	27	2	4	4	
SPAIN	11	11		1	1	
SRI LANKA	2		2	1		1
SWEDEN	23	23		7	7	
SWITZERLAND	16	16		8	8	
TAIWAN	67	9	58	42	6	36
TURKEY	11	1	10	6		6
U.K.	208	207	1	107	106	1
VENEZUELA	3	3		1	1	
TOTAL:	1573	1238	335	574	450	124

TABLE 2: Time series frequency distribution of sample composition

This table presents the number of cross-listings by decades, according to the listing date of each company. Panel A presents all *identified* companies (from home countries corresponding to the countries of the studied companies). The *identified* cross-listings set is the basis for the construction of CL-intensity$_i$, the number of cross-listings originating from firm *i*'s home country, existing prior to firm *i*'s cross-listing date and active in the week of firm *i*'s cross-listing. The *identified* cross-listings set is the basis for the identification of cross-listings included in the augmented diversification portfolios, subject to availability of price data for the cross-listed security in the host market. Panel B presents the *studied* companies, subset of the sample in Panel A subject to availability of home-exchange price data and analyst following for 24 months around cross-listing date (see data description in Section 2).

Panel A: *Identified* Cross-Listings

	pre-1960	1960-69	1970-79	1980-89	1990-99	2000-09	Total all decades
All firms	4	14	57	132	701	665	1573
Developed Markets	4	8	42	109	362	233	758
Emerging Markets		6	15	23	339	432	815
US-hosts	4	14	57	130	592	441	1238
Non-US hosts				2	109	224	335

Panel B: *Studied* Cross-Listings

	pre-1960	1960-69	1970-79	1980-89	1990-99	2000-09	Total all decades
All firms				43	298	233	574
Developed Markets				43	175	119	337
Emerging Markets					123	114	237
US-hosts				42	240	168	450
Non-US hosts				1	58	65	124

TABLE 3: Summary statistics for Weekly Returns and Abnormal Performance around Cross-Listing dates

Panel A reports statistics for the weekly (Wednesday close) returns of Cross-Listing firms, denominated in U.S. dollars, during the 24 months period around their cross-listing date. The returns are computed in excess of the weekly rate for the 1-month US Treasury bill (Source: K. French online data library) and are expressed in percentages. For each category of subsample, we report cross sectional mean of time series averages, separately for the 12 months prior to the cross-listing week, the cross-listing week, and the 12 months after the cross-listing week. P-values are derived from robust t-statistics computed using heteroskedasticity-consistent standard errors following White correction. "n.a." is reported when a test cannot be performed due to insufficient degrees of freedom in the subsample. For each period, we test for zero difference in means between subsamples using a two-sided t-test for independent samples, whose p-values are reported.

Panel B reports statistics for the weekly (Wednesday close) abnormal returns of Cross-Listing firms during the 24 months period around their cross-listing date. The abnormal returns are computed from the estimation of Equation 1 (Section 3.2):

$$R_{i,t} = \alpha_{PRE,i} + \beta^{L}_{PRE,i} R^{L}_{t} + \beta^{W}_{PRE,i} R^{W}_{t} + \alpha_{DUR,i} D_{DUR,i,t} + \alpha_{PST,i} D_{PST,i,t} + \beta^{L}_{PST,i} R^{L}_{t} D_{PST,i,t} + \beta^{W}_{PST,i} R^{W}_{t} D_{PST,i,t} + \varepsilon_{i,t}$$

$\alpha_{PRE,i}$, $\alpha_{DUR,i}$ and $\alpha_{PST,i}$ measure the abnormal performance over the two-factors return generating process during the 52 weeks prior to the week of cross-listing, during the cross-listing week, and during the 52 weeks after the week of cross-listing respectively. For each category of subsample, we report cross sectional mean of abnormal returns, separately for the 12 months prior to the cross-listing week, the cross-listing week, and the 12 months after the cross-listing week. Abnormal returns are expressed in percentages. P-values are derived from robust t-statistics computed using heteroskedasticity-consistent standard errors following White correction. "n.a." is reported when a test cannot be performed due to insufficient degrees of freedom in the subsample. For each period, we test for zero difference in means between subsamples using a two-sided t-test for independent samples, whose p-values are reported.

Panel A: weekly returns of cross-listing firms

	Full Sample		1980-1989		1990-1999		2000-2009	
	Mean (%)	pval	Mean (%)	pval	Mean (%)	pval	Mean (%)	pval
1. Before Cross-Listing (weeks -52 to -1)								
All firms	0.454	0.000	0.177	0.102	0.492	0.000	0.457	0.000
Developed Markets	0.366	0.000	0.177	0.102	0.422	0.000	0.352	0.004
Emerging Markets	0.580	0.000			0.592	0.000	0.567	0.000
US-hosts	0.399	0.000	0.150	0.159	0.480	0.000	0.346	0.000
Non-US hosts	0.656	0.000	1.291	n.a.	0.544	0.000	0.746	0.000
Difference in means (pval)		t-test		t-test		t-test		t-test
Developed vs. Emerging Markets		0.019				0.156		0.179
US-hosts vs. non-US hosts		0.017		n.a.		0.645		0.021
2. Cross-Listing Week								
All firms	-0.530	0.147	1.532	0.405	-0.889	0.065	-0.452	0.423
Developed Markets	-0.390	0.405	1.532	0.405	-0.813	0.171	-0.463	0.539
Emerging Markets	-0.729	0.212			-0.996	0.219	-0.441	0.603
US-hosts	-0.534	0.210	1.406	0.454	-1.007	0.073	-0.342	0.607
Non-US hosts	-0.518	0.454	6.824	n.a.	-0.399	0.643	-0.736	0.493
Difference in means (pval)		t-test		t-test		t-test		t-test
Developed vs. Emerging Markets		0.651				0.855		0.984
US-hosts vs. non-US hosts		0.984		n.a.		0.554		0.754
3. After Cross-Listing (weeks +1 to +52)								
All firms	-0.342	0.000	-0.220	0.010	-0.204	0.002	-0.541	0.000
Developed Markets	-0.254	0.000	-0.220	0.010	-0.054	0.528	-0.561	0.000
Emerging Markets	-0.467	0.000			-0.419	0.000	-0.519	0.000
US-hosts	-0.297	0.000	-0.187	0.019	-0.144	0.061	-0.543	0.000
Non-US hosts	-0.507	0.000	-1.581	n.a.	-0.456	0.000	-0.535	0.016
Difference in means (pval)		t-test		t-test		t-test		t-test
Developed vs. Emerging Markets		0.054				0.006		0.834
US-hosts vs. non-US hosts		0.131		n.a.		0.025		0.976

(Table 3 continued)

Panel B: Abnormal performance around cross-listing

	Full Sample		1980-1989		1990-1999		2000-2009	
	Mean (%)	pval	Mean (%)	pval	Mean (%)	pval	Mean (%)	pval
1. Before Cross-Listing (weeks -52 to -1 ; α_{PRE})								
All firms	0.320	0.000	-0.108	0.256	0.314	0.000	0.407	0.000
Developed markets	0.292	0.000	-0.108	0.256	0.288	0.000	0.442	0.000
Emerging markets	0.360	0.000			0.351	0.000	0.370	0.000
US-hosts	0.313	0.000	-0.136	0.147	0.335	0.000	0.394	0.000
Non-US hosts	0.346	0.000	1.055	n.a.	0.228	0.018	0.441	0.000
Difference in means (pval)		t-test		t-test		t-test		t-test
Developed vs. Emerging Markets		0.391				0.570		0.581
US-hosts vs. non-US hosts		0.704		n.a.		0.350		0.734
2. Cross-Listing Week (α_{DUR})								
All firms	-1.039	0.002	1.663	0.374	-1.448	0.002	-1.016	0.033
Developed markets	-0.768	0.089	1.663	0.374	-1.428	0.014	-0.676	0.320
Emerging markets	-1.425	0.006			-1.476	0.056	-1.370	0.042
US-hosts	-1.037	0.010	1.569	0.412	-1.603	0.004	-0.880	0.129
Non-US hosts	-1.049	0.062	5.607	n.a.	-0.808	0.287	-1.366	0.101
Difference in means (pval)		t-test		t-test		t-test		t-test
Developed vs. Emerging Markets		0.335				0.960		0.466
US-hosts vs. non-US hosts		0.986		n.a.		0.393		0.629
3. After Cross-Listing (weeks +1 to +52 ; α_{PST})								
All firms	-0.533	0.000	-0.051	0.649	-0.519	0.000	-0.640	0.000
Developed markets	-0.481	0.000	-0.051	0.649	-0.457	0.000	-0.672	0.000
Emerging markets	-0.607	0.000			-0.607	0.000	-0.607	0.000
US-hosts	-0.494	0.000	0.003	0.975	-0.519	0.000	-0.583	0.000
Non-US hosts	-0.673	0.000	-2.308	n.a.	-0.515	0.000	-0.788	0.000
Difference in means (pval)		t-test		t-test		t-test		t-test
Developed vs. Emerging Markets		0.282				0.294		0.762
US-hosts vs. non-US hosts		0.206		n.a.		0.979		0.396

TABLE 4: Diversification portfolios

This table details informations on diversification portofolios. The global diversification portfolios are constructed from a step-wise regression of the firm *i*'s return on the world market index and ten industry indices (level 2 - ICB classification). The augmented diversification porfolios are constructed from regression of the firm *i*'s return on its global diversification portfolio, up to three country funds and up to five cross-listings (CLs) preceding the date of cross-listing of firm *i*.

Panel A reports, for all firms in the sample, the composition of the global and augmented diversification portfolios, and the values of the correlation between firm *i*'s returns and returns of its diversification portfolio. All correlation numbers are averages. The two-sided *t-test* tests the null hypothesis that correlations for Developed Market firms (resp. for firms listing on US-host exchanges) are equal to the correlations for Emerging Market firms (resp. for firms listing on non-US host exchanges). The one-sided *t-test* tests the equality of correlations against the alternative that the correlations for Developed Market firms (resp. for firms listing on US-host exchanges) are higher than the correlations for Emerging Market firms (resp. for firms listing on non-US host exchanges). We report the significance level for both tests in parenthesis.

Panel B describes the augmented diversification portfolios for firms of each country, and reports the correlations between firm *i*'s returns and its augmented diversification portfolio. All correlation numbers are averages.

Panel A

	Global diversification portfolio				Augmented diversification portfolio			
			t-test for equality				t-test for equality	
	No. global industries	Correlations	Two-sided	One-sided	No. preceding CLs	Correlations	Two-sided	One-sided
All firms	2.0	0.48			4.6	0.62		
Developed Markets	2.1	0.51	(0.00)	(0.00)	4.7	0.61	(0.393)	(0.804)
Emerging Markets	1.8	0.43			4.4	0.62		
US-hosts	2.0	0.50	(0.00)	(0.00)	4.7	0.62	(0.311)	(0.155)
Non-US hosts	1.9	0.42			4.2	0.61		

Panel B

	Date of first CL in *studied* sample	Date of first CL in augm. diversification porfolio	No. country funds in augm. diversification porfolio	Date of first country fund	No. firms with positive / negative correlations	Average correlations			
						Full sample	1980-1989	1990-1999	2000-2009
ARGENTINA	Nov-93	May-93	0.8	Oct-91	10 / 0	0.72		0.72	0.73
AUSTRALIA	Aug-87	Jan-73	2.1	Nov-81	20 / 0	0.56	0.69	0.52	0.52
BELGIUM	Sep-97	Mar-96	-	-	3 / 0	0.53		0.44	0.58
BRAZIL	May-97	May-92	1.8	Apr-88	30 / 0	0.66		0.64	0.67
CANADA	Jan-83	Jan-73	1.0	Apr-86	98 / 0	0.58	0.63	0.57	0.59
CHILE	Sep-92	Jul-90	2.0	Sep-89	18 / 0	0.62		0.62	0.68
CHINA	Dec-03	Oct-92	2.0	Jul-92	2 / 0	0.44			0.44
COLOMBIA	Nov-94	Nov-94	-	-	2 / 0	0.35		0.35	
CZECH REPUBLIC	Jun-98	Oct-94	-	-	2 / 0	0.58		0.58	
DENMARK	Apr-94	Sep-81	-	-	3 / 0	0.42		0.34	0.57
FINLAND	Jul-94	Aug-83	-	-	6 / 0	0.58		0.58	0.58
FRANCE	Nov-89	Aug-78	0.1	Jun-86	18 / 0	0.64	0.50	0.59	0.73
GERMANY	May-92	May-92	1.0	Jan-90	17 / 0	0.68		0.60	0.72
GREECE	Nov-98	Jun-98	-	-	5 / 0	0.70		0.63	0.81
HONG KONG	Dec-88	Dec-88	0.8	Nov-91	5 / 0	0.59	0.45	0.65	0.60
HUNGARY	Nov-95	Nov-95	-	-	2 / 0	0.64		0.64	
INDIA	Feb-93	Jan-73	2.9	Aug-88	71 / 0	0.60		0.54	0.66
IRELAND	Jul-86	Nov-84	0.6	Apr-90	8 / 0	0.56	0.53	0.58	

(Table 4 continued)

ISRAEL	Nov-95	Jan-73	1.3	Oct-92	7 / 0	0.52		0.54	0.47
ITALY	Feb-89	Jul-87	1.0	Feb-86	8 / 0	0.61	0.67	0.57	
JAPAN	Jun-82	Jan-73	1.8	Mar-90	10 / 0	0.77	0.88	0.84	0.73
KOREA	Jun-95	Oct-94	3.0	Aug-84	8 / 0	0.66		0.49	0.69
MEXICO	Jun-92	Jan-73	3.0	Jun-81	14 / 0	0.67		0.67	
NETHERLANDS	Dec-86	Jan-73	-	-	9 / 0	0.68	0.67	0.75	0.51
NEW ZEALAND	Dec-93	Jan-81	1.0	Oct-88	2 / 0	0.60		0.43	0.77
NORWAY	Jun-92	May-83	-	-	6 / 0	0.61		0.63	0.50
PAKISTAN	Dec-06	Jul-97	-	-	2 / 0	0.47			0.47
PERU	May-96	Sep-94	-	-	2 / 0	0.52		0.52	
PHILIPPINES	Jan-06	Jan-73	1.0	Nov-89	1 / 0	0.49			0.49
POLAND	Nov-00	Aug-97	-	-	2 / 0	0.63			0.63
PORTUGAL	Jun-92	Jun-92	-	-	1 / 0	0.58		0.58	
QATAR	Jul-08	Jul-99	-	-	1 / 0	0.57			0.57
RUSSIA	Nov-06	Nov-96	2.8	Mar-90	4 / 0	0.59			0.59
SOUTH AFRICA	Oct-96	Jan-73	1.0	Feb-94	4 / 0	0.71		0.78	0.49
SPAIN	Oct-97	Jul-83	1.0	Feb-90	1 / 0	0.75		0.75	
SRI LANKA	Mar-94	Mar-94	-	-	0 / 1	-0.06		-0.06	
SWEDEN	Jul-87	Jan-78	-	-	7 / 0	0.68	0.65	0.64	0.73
SWITZERLAND	Jan-95	Jan-95	1.8	Aug-87	8 / 0	0.70		0.52	0.75
TAIWAN	May-93	Jun-93	2.4	Dec-86	42 / 0	0.67		0.65	0.68
TURKEY	Mar-94	Dec-94	1.0	Dec-89	6 / 0	0.62		0.55	0.76
U.K.	Nov-83	Jan-73	0.7	Aug-87	107 / 0	0.62	0.70	0.58	0.65
VENEZUELA	Jan-97	Mar-93	-	-	1 / 0	0.50		0.50	

TABLE 5: Analyst coverage around Cross-Listing

This table reports information and statistics for the analysts following the cross-listing firms, over the 24 months period around their cross-listing date. For each category of subsample, we report the mean and median number of analysts following the companies during the 12 months prior to the cross-listing week, and the 12 months after the cross-listing week.

Panel A reports infomation across all firms. Within each period, we test for equality across category of subsamples using a two-sample *t-test* for the mean statistics and a nonparametric *Wilcoxon test* for the median statistics. The two-sided test is for the null hypothesis that the analyst coverage for Developed Market firms (resp. for firms listing on US-host exchanges) is equal to the analyst coverage for Emerging Market firms (resp. for firms listing on non-US host exchanges). The one-sided test is for equality against the alternative that the analyst coverage for Developed Market firms (resp. for firms listing on US-host exchanges) is higher than the analyst coverage for Emerging Market firms (resp. for firms listing on non-US host exchanges). We report the the significance level for both tests in parenthesis.

The last column presents a paired two-sample *t-test* for equal average analyst against higher average analyst coverage in post-CL vs. pre-CL period, and a nonparametric *Wilcoxon test* for equal median analyst coverage against higher median analyst coverage in the post-CL vs. pre-CL period. For both tests, ***, ** and * denote significance at the 1, 5 and 10 percent level, respectively. "n.a." is reported when a test cannot be performed due to insufficient degrees of freedom in the subsample.

Panel B reports information for firms of each country. We present a paired two-sample *t-test* for equal mean and a nonparametric *Wilcoxon test* for equal median analyst coverage like the tests in the previous panel. For both tests, ***, ** and * denote significance at the 1, 5 and 10 percent level, respectively. "n.a." is reported when a test cannot be performed due to insufficient degrees of freedom in the subsample.

Panel A

		Pre cross-listing			Post cross-listing			
			Test for equality			Test for equality		
		Analyst coverage	Two-sided	One-sided	Analyst coverage	Two-sided	One-sided	Difference Post-Pre
All firms	*Mean*	14.58			17.4			***
	Median	12			16			***
Developed Markets	*Mean*	17.12	(0.000)	(0.000)	19.77	(0.000)	(0.000)	***
Emerging Markets	*Mean*	10.97			14.02			***
Developed Markets	*Median*	15	(0.000)	(0.000)	18	(0.000)	(0.000)	***
Emerging Markets	*Median*	8			12			***
US-hosts	*Mean*	16.43	(0.000)	(0.000)	19.34	(0.000)	(0.000)	***
Non-US hosts	*Mean*	7.88			10.34			***
US-hosts	*Median*	14	(0.000)	(0.000)	17	(0.000)	(0.000)	***
Non-US hosts	*Median*	6			9			***

Panel B

		Full sample Pre / Post		1980-1989 Pre / Post		1990-1999 Pre / Post		2000-2009 Pre / Post	
ARGENTINA	*Mean*	13.7 / 17.7	**			20 / 27.2	*	7.4 / 8.2	
	Median	12 / 15.5	*			13 / 29	*	3 / 4	
AUSTRALIA	*Mean*	10.35 / 11.2		16.4 / 18.2		9.45 / 9.73		5.25 / 6.5	**
	Median	9.5 / 12.5		20 / 19		6 / 6		5 / 6.5	*
BELGIUM	*Mean*	31 / 34				32 / 30	n.a.	30.5 / 36	
	Median	32 / 31				32 / 30	n.a.	30.5 / 36	
BRAZIL	*Mean*	24.27 / 23.17				34.7 / 30.7		19.05 / 19.4	
	Median	26 / 23				36.5 / 35		17 / 17	
CANADA	*Mean*	11.47 / 14.44	***	14.88 / 20.63	***	12.35 / 15.08	***	9.76 / 12.46	***
	Median	11 / 14	***	16 / 22	**	12 / 15	***	8 / 11	***
CHILE	*Mean*	5.83 / 12.89	***			6.13 / 13.56	***	3.5 / 7.5	
	Median	4 / 11.5	***			4 / 12.5	***	3.5 / 7.5	
CHINA	*Mean*	3.5 / 20.5						3.5 / 20.5	
	Median	3.5 / 20.5						3.5 / 20.5	
COLOMBIA	*Mean*	4 / 6.5				4 / 6.5			
	Median	4 / 6.5				4 / 6.5			
CZECH REPUBLIC	*Mean*	17.5 / 23	*			17.5 / 23	*		
	Median	17.5 / 23				17.5 / 23			
DENMARK	*Mean*	7.33 / 19				10.5 / 27		1 / 3	n.a.
	Median	2 / 24				10.5 / 27		1 / 3	n.a.
FINLAND	*Mean*	23.33 / 25.5				26.5 / 30.25		17 / 16	
	Median	25 / 25				27 / 28		17 / 16	

(Table 5 continued)

FRANCE	*Mean*	33.28 / 35.94	*	23 / 29	n.a.	35 / 40.67	**	32.63 / 31.5	
	Median	31.5 / 34.5	*	23 / 29	n.a.	36 / 37	**	30.5 / 31	
GERMANY	*Mean*	29.12 / 33.35	***			35.5 / 40.83	**	25.64 / 29.27	***
	Median	30 / 39	***			39 / 43	**	29 / 32	**
GREECE	*Mean*	16.6 / 18.4				17 / 17.67		16 / 19.5	
	Median	17 / 17				17 / 17		16 / 19.5	
HONG KONG	*Mean*	22.6 / 31.4	**	14 / 17	n.a.	26 / 35	*	23.5 / 35	
	Median	14 / 26	**	14 / 17	n.a.	26 / 35		23.5 / 35	
HUNGARY	*Mean*	11 / 15	*			11 / 15	*		
	Median	11 / 15				11 / 15			
INDIA	*Mean*	6.66 / 9.56	***			4.77 / 7.97	***	8.5 / 11.11	***
	Median	4 / 7	***			3 / 6	***	5 / 9	***
IRELAND	*Mean*	9.13 / 9.25		6 / 6		11 / 11.2			
	Median	9 / 9		6 / 8		9 / 9			
ISRAEL	*Mean*	2.43 / 5.14	**			3 / 5.6	*	1 / 4	
	Median	1 / 6	**			1 / 6	*	1 / 4	
ITALY	*Mean*	24.38 / 27.75	**	15.67 / 22.67	*	29.6 / 30.8			
	Median	22 / 26	**	15 / 25	*	29 / 30			
JAPAN	*Mean*	12.4 / 13.9	**	1 / 4	n.a.	8 / 10		15.29 / 16.43	*
	Median	11 / 14.5	**	1 / 4	n.a.	8 / 10		14 / 17	*
KOREA	*Mean*	13.13 / 19.25	**			4 / 3	n.a.	14.43 / 21.57	***
	Median	11 / 20.5	**			4 / 3	n.a.	13 / 21	**
MEXICO	*Mean*	18.29 / 27.21	***			18.29 / 27.21	***		
	Median	18 / 27	***			18 / 27	***		
NETHERLANDS	*Mean*	29.89 / 32.89	*	14.5 / 23		39 / 42.4	**	22.5 / 19	
	Median	28 / 34	*	14.5 / 23		41 / 42	*	22.5 / 19	
NEW ZEALAND	*Mean*	10.5 / 8				10 / 10	n.a.	11 / 6	n.a.
	Median	10.5 / 8				10 / 10	n.a.	11 / 6	n.a.
NORWAY	*Mean*	16.17 / 22.5	***			19.2 / 24.4	**	1 / 13	n.a.
	Median	15 / 18.5	**			19 / 22	**	1 / 13	n.a.
PAKISTAN	*Mean*	2.5 / 5.5						2.5 / 5.5	
	Median	2.5 / 5.5						2.5 / 5.5	
PERU	*Mean*	12 / 21.5	*			12 / 21.5	*		
	Median	12 / 21.5				12 / 21.5			
PHILIPPINES	*Mean*	6 / 6	n.a.					6 / 6	n.a.
	Median	6 / 6	n.a.					6 / 6	n.a.
POLAND	*Mean*	13.5 / 11.5						13.5 / 11.5	
	Median	13.5 / 11.5						13.5 / 11.5	
PORTUGAL	*Mean*	3 / 8	n.a.			3 / 8	n.a.		
	Median	3 / 8	n.a.			3 / 8	n.a.		
QATAR	*Mean*	4 / 10	n.a.					4 / 10	n.a.
	Median	4 / 10	n.a.					4 / 10	n.a.
RUSSIA	*Mean*	7.75 / 12.5	**					7.75 / 12.5	**
	Median	7.5 / 12.5	**					7.5 / 12.5	**
SOUTH AFRICA	*Mean*	6.25 / 7.25				7 / 8		4 / 5	n.a.
	Median	6 / 6.5				7 / 8		4 / 5	n.a.
SPAIN	*Mean*	44 / 44	n.a.			44 / 44	n.a.		
	Median	44 / 44	n.a.			44 / 44	n.a.		
SRI LANKA	*Mean*	5 / 5	n.a.			5 / 5	n.a.		
	Median	5 / 5	n.a.			5 / 5	n.a.		
SWEDEN	*Mean*	22.57 / 21.86		1 / 10	n.a.	42 / 38		10.33 / 9.67	
	Median	3 / 10		1 / 10	n.a.	62 / 55		3 / 2	
SWITZERLAND	*Mean*	35 / 35.75				25.5 / 23.5		38.17 / 39.83	
	Median	32.5 / 33				25.5 / 23.5		32.5 / 33	
TAIWAN	*Mean*	9.45 / 10.64	**			9.13 / 11.6	**	9.63 / 10.11	
	Median	9 / 10	**			9 / 10	***	9 / 10	
TURKEY	*Mean*	12.33 / 14.33	*			9.25 / 10.5		18.5 / 22	
	Median	10 / 12	*			9 / 11		18.5 / 22	
U.K.	*Mean*	16.21 / 18.64	***	10.72 / 17.17	***	16.95 / 18.75	***	18.23 / 19.38	*
	Median	18 / 19	***	7 / 15.5	***	18 / 18	***	19.5 / 19	
VENEZUELA	*Mean*	5 / 10	n.a.			5 / 10	n.a.		
	Median	5 / 10	n.a.			5 / 10	n.a.		

TABLE 6: Roles of financial segmentation and investor recognition in the price effect around cross-listing

This table reports estimated coefficients for a set of six cross-sectional regressions of abnormal returns on variables related to the degree of firms' financial segmentation, investor awareness, number of cross-listings from the same country active at the time of cross-listing, and controls for trading volume, size and home country corporate governance:

$$\alpha_{PRE,i} = \phi_1 + \phi_2 CORR_{DIV,i} + \phi_3 \Delta\lambda_i + \phi_4 \mathrm{LIQ}_i + \phi_5 \mathrm{GOV}_i + \phi_6 \mathrm{SIZE}_i + \phi_7 \mathrm{CL\text{-}intensity}_i + \phi_8 \mathrm{CL\text{-}intensity}_i \times CORR_{DIV,i} + \phi_9 \mathrm{CL\text{-}intensity}_i \times \Delta\lambda_i + \upsilon_i$$

The dependent variable ($\alpha_{PRE,i}$) represents the abnormal returns computed from the estimation of Equation 1 presented in Section 3.2. It measures the abnormal performance over a two-factor return generating process during the 52 weeks prior to the week of cross-listing. $CORR_{DIV,i}$ is the correlation of firm i's returns with the returns of its diversification portfolio over the 52 weeks preceding the cross-listing week. $\Delta\lambda_i$ is the change in firm *i*'s shadow cost of information, derived from the difference of the inverse of the number of analysts following the firm over the 24 months around the cross-listing week (Source: I/B/E/S), multiplied by the residual variance of the estimation of Equation 1, multiplied by the ratio of firm *i*'s market value to world market value at the date of cross-listing (Source: Datastream; following Kadlec and McConnell (1994)). υ_i denotes the white noise error term. LIQ_i=LN(1+$TURN_i$), where $TURN_i$ is the average daily share turnover ratio of firm *i* in its home market, measured during the 52 weeks before cross-listing (Source: Datastream). GOV_i is the revised anti-directors-rights index of Djankov et al. (2008) for firm *i*'s home country. $SIZE_i$ is the natural log of firm *i*'s market capitalization, averaged over the 52 weeks prior to the week of cross-listing. CL-intensity$_i$ refers to the number of cross-listings originating from firm *i*'s home country, existing prior to firm *i*'s cross-listing date and active in the week of firm *i*'s cross-listing, on all host exchanges (Source: authors' compilation based on cross-listing information files from BoNY, Citibank, JPM, DB and CRSP). Developed and emerging market classification is based on MSCI Barra classification, supplemented by IMF classification if necessary.

Dependent variable	$\alpha_{PRE,i}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.0084 ***	0.0030 ***	0.0119 **	0.0113 ***	0.0117 **	0.0091 **
$CORR_{DIV,i}$	-0.0084 ***		-0.0019		-0.0008	0.0056
$\Delta\lambda_i$		-0.1144 ***		-0.2959 ***	-0.2951 ***	-0.1356 **
LIQ_i			0.0001	0.0023	0.0024	0.0023
GOV_i			0.0005	0.0003	0.0003	-0.0004
$SIZE_i$			-0.0012 ***	-0.0013 ***	-0.0013 ***	-0.0013 ***
CL-intensity$_i$						0.0001 ***
CL-intensity$_i$ x $CORR_{DIV,i}$						-0.0002 **
CL-intensity$_i$ x $\Delta\lambda_i$						-0.0043 ***

	Interactions with CL-intensity$_i$		
	Value (quantile)	*Interaction $CORR_{DIV,i}$*	*Interaction $\Delta\lambda_i$*
	14.5 (25%)	0.0034	-0.1984 ***
	35 (50%)	0.0003	-0.2872 ***
	46.78 (Avg)	-0.0014	-0.3382 ***
	75.5 (75%)	-0.0057	-0.4627 ***
	154 (1)	-0.0175 **	-0.8027 ***

Number of observations:	574	574	519	519	519	519
Number of Developed Maket firms	*337*	*337*	*304*	*304*	*304*	*304*
Number of Emerging Maket firms	*237*	*237*	*215*	*215*	*215*	*215*
Adj. R^2	1.23%	1.95%	0.36%	10.55%	10.39%	14.94%

****, ** and * indicate significance at the 1, 5 and 10 percent level, respectively. t-statistics use WHITE standard errors corrected for heteroskedasticity*

TABLE 7: Roles of financial segmentation and investor recognition in the price effect - Extension

This table reports estimated coefficients for a set of three cross-sectional regressions of abnormal returns on variables related to the degree of firms' financial isegmentation investor awareness, number of cross-listings from the same country active at the time of cross-listing, and controls for trading volume , size and home country corporate governance:

$$\alpha_{PRE,i} = \phi_1 + \phi_2 CORR_{DIV,i} + \phi_3 \Delta\lambda_i + \phi_4 \text{LIQ}_i + \phi_5 \text{GOV}_i + \phi_6 \text{SIZE}_i + \phi_7 \text{CL-intensity}_i + \phi_8 \text{CL-intensity}_i \times CORR_{DIV,i} + \phi_9 \text{CL-intensity}_i \times \Delta\lambda_i + \upsilon_i$$

The dependent variable ($\alpha_{PRE,i}$) represents the abnormal returns computed from the estimation of Equation 1 presented in Section 3.2. It measures the abnormal performance over a two-factor return generating process during the 52 weeks prior to the week of cross-listing. $CORR_{DIV,i}$ is the correlation of firm *i*'s returns with the returns of its diversification portfolio over the 52 weeks preceding the cross-listing week. $\Delta\lambda_i$ is the change in firm *i*'s shadow cost of information, derived from the difference of the inverse of the number of analysts following the firm over the 24 months around the cross-listing week (Source: I/B/E/S), multiplied by the residual variance of the estimation of Equation 1, multiplied by the ratio of firm i's market value to world market value at the date of cross-listing (Source: Datastream; following Kadlec and McConnell (1994)). υ_i denotes the white noise error term. LIQ_i=LN(1+$TURN_i$), where $TURN_i$ is the average daily share turnover ratio of firm *i* in its home market, measured during the 52 weeks before cross-listing (Source: Datastream). GOV_i is the revised anti-directors-rights index of Djankov et al. (2008) for firm *i*'s home country. $SIZE_i$ is the natural log of firm *i*'s market capitalization, averaged over the 52 weeks prior to the week of cross-listing. CL-intensity$_i$ refers to the number of cross-listings originating from firm *i*'s home country, existing prior to firm *i*'s cross-listing date and active in the week of firm *i*'s cross-listing, on the same host exchange as firm *i*. (Source: authors' compilation based on cross-listing information files from BoNY, Citibank, JPM, DB and CRSP). Developed and emerging market classification is based on MSCI Barra classification, supplemented by IMF classification if necessary.

Panel A - EMs

Dependent variable	$\alpha_{PRE,i}$								
	EMs in all hosts				EMs in non-US hosts				
	(3)	(4)	(6)		(3)	(4)	(6)		
Constant	0.01883 ***	0.01373 ***	0.00937 *		0.0251 ***	0.0200 ***	0.0204 **		
$CORR_{DIV,i}$	-0.01190 **		0.00044		-0.0158 ***		-0.0080		
$\Delta\lambda_i$		-0.11814	0.01772			-0.3436	-0.5523		
LIQ_i	-0.00127	0.00097	0.00032		0.0082	0.0043	0.0103		
GOV_i	-0.00020	-0.00020	-0.00050		-0.0007	-0.0009	-0.0025 **		
$SIZE_i$	-0.00094 *	-0.00132 ***	-0.00067		-0.0013 *	-0.0019 **	-0.0008		
CL-intensity$_i$			0.00030 ***				0.0004 ***		
CL-intensity$_i$ x $CORR_{DIV,i}$			-0.00043 ***				-0.0004 ***		
CL-intensity$_i$ x $\Delta\lambda_i$			-0.00600 *				0.0023		
			Interactions with CL-intensity$_i$				Interactions with CL-intensity$_i$		
			Value (quantile)	*Interaction $CORR_{DIV,i}$*	*Interaction $\Delta\lambda_i$*		*Value (quantile)*	*Interaction $CORR_{DIV,i}$*	*Interaction $\Delta\lambda_i$*
			12 (25%)	-0.00476	-0.05426		13 (25%)	-0.0134 **	-0.5226
			29 (50%)	-0.01213 **	-0.15622		34.5 (50%)	-0.0225 ***	-0.4737
			34.62 (Avg)	-0.01457 ***	-0.18995 *		42.39 (Avg)	-0.0258 ***	-0.4557
			44 (75%)	-0.01864 ***	-0.24619 *		50 (75%)	-0.0290 ***	-0.4384
			154 (1)	-0.06632 ***	-0.90595 *		154 (1)	-0.0728 ***	-0.2016
Number of observations:	215	215	215		104	104	104		
Number of Developed Maket firms					*0*	*0*	*0*		
Number of Emerging Maket firms	*215*	*215*	*215*		*104*	*104*	*104*		
Adj. R^2	4.72%	2.50%	9.94%		9.10%	4.49%	22.26%		

****, ** and * indicate significance at the 1, 5 and 10 percent level, respectively. t-statistics use WHITE standard errors corrected for heteroskedasticity*

(Table 7 continued)

Panel B - By Market Value

Dependent variable $\alpha_{PRE,i}$	Bottom three deciles of Market Value in US hosts			Top three deciles of Market Value in US hosts		
	(3)	(4)	(6)	(3)	(4)	(6)
Constant	-0.0040	-0.0031	-0.0058	-0.0020	0.0005	0.0000
$CORR_{DIV,i}$	0.0002		0.0099	0.0026		0.0018
$\Delta\lambda_i$		-0.4985	-0.5442		-0.3007 ***	-0.0697
LIQ_i	-0.0111	-0.0101	-0.0049	-0.0019	0.0016	-0.0004
GOV_i	0.0025	0.0021	0.0001	0.0006	0.0003	0.0002
CL-intensity$_i$			0.0002			0.0000
CL-intensity$_i$ x $CORR_{DIV,i}$			-0.0001			0.0000
CL-intensity$_i$ x $\Delta\lambda_i$			-0.0059			-0.0054 ***
			Interactions with CL-intensity$_i$			Interactions with CL-intensity$_i$
			Value (quantile) *Interaction $CORR_{DIV,i}$* *Interaction $\Delta\lambda_i$*			*Value (quantile)* *Interaction $CORR_{DIV,i}$* *Interaction $\Delta\lambda_i$*
			14.75 (25%) 0.0085 -0.6318			14 (25%) 0.0024 -0.1451 ***
			35.5 (50%) 0.0065 -0.7551 *			34 (50%) 0.0031 -0.2529 ***
			48.40 (Avg) 0.0052 -0.8317 *			50.04 (Avg) 0.0037 -0.3394 ***
			85 (75%) 0.0017 -1.0491			93 (75%) 0.0053 -0.5709 ***
			120 (1) -0.0017 -1.2569			131 (1) 0.0068 -0.7757 ***
Number of observations:	124	124	124	138	138	138
Number of Developed Maket firms	*88*	*88*	*88*	*115*	*115*	*115*
Number of Emerging Maket firms	*36*	*36*	*36*	*23*	*23*	*23*
Adj. R^2	-0.39%	0.97%	6.01%	-1.35%	27.10%	47.02%

****, ** and * indicate significance at the 1, 5 and 10 percent level, respectively. t-statistics use WHITE standard errors corrected for heteroskedasticity*

(Table 7 continued)

Panel C - By Anti-Directors Rights (GOV_i)

Dependent variable $\alpha_{PRE,i}$	GOV_i < median(GOV) in US hosts			GOV_i < median(GOV) in all hosts		
	(3)	(4)	(6)	(3)	(4)	(6)
Constant	0.0015	0.0015	0.0131 **	0.0062	0.0043	0.0073
$CORR_{DIV,i}$	0.0019		-0.0161 *	-0.0033		-0.0082
$\Delta\lambda_i$		-0.4417 ***	0.2854		-0.3468 **	-0.3962
LIQ_i	0.0231	0.0271	0.0239	0.0152	0.0159	0.0193 *
$SIZE_i$	-0.0001	-0.0001	-0.0002	-0.0002	-0.0003	-0.0002
CL-$intensity_i$			-0.0010 ***			-0.0001
CL-$intensity_i$ x $CORR_{DIV,i}$			0.0014 ***			0.0003
CL-$intensity_i$ x $\Delta\lambda_i$			-0.0744 **			0.0019

Interactions with CL-$intensity_i$			Interactions with CL-$intensity_i$		
Value (quantile)	*Interaction $CORR_{DIV,i}$*	*Interaction $\Delta\lambda_i$*	*Value (quantile)*	*Interaction $CORR_{DIV,i}$*	*Interaction $\Delta\lambda_i$*
6 (25%)	-0.0077	-0.1609	6 (25%)	-0.0065	-0.3850 **
13 (50%)	0.0021	-0.6815 ***	13.5 (50%)	-0.0043	-0.3709 **
15.06 (Avg)	0.0050	-0.8349 ***	17.69 (Avg)	-0.0030	-0.3629 **
23 (75%)	0.0162 **	-1.4253 ***	28 (75%)	-0.0001	-0.3438
72 (1)	0.0850 ***	-5.0699 ***	72 (1)	0.0127	-0.2613

Number of observations:	113	113	113	160	160	160
Number of Developed Maket firms	*75*	*75*	*75*	*75*	*75*	*75*
Number of Emerging Maket firms	*38*	*38*	*38*	*85*	*85*	*85*
Adj. R^2	-1.62%	4.55%	11.58%	0.35%	2.96%	2.94%

****, ** and * indicate significance at the 1, 5 and 10 percent level, respectively. t-statistics use WHITE standard errors corrected for heteroskedasticity*

FIGURE 1
Cross Listing intensity for all companies by year