# 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 research the impact of the sequencing of cross-listing, defined as the cumulative number of companies having an active cross-listing among more than 1,800 firms from 41 countries over three decades. We examine whether the segmentation hypothesis is a relevant driver of price effects, whether the improvement in the firm information subsumes these effects, and to what extent both channels are affected by the cross-listing activity from the home country of the underlying security. Controlling for home-country governance level and firm-specific liquidity, we find that support for the segmentation hypothesis is statistically stronger for Emerging Market companies listing outside US markets while the improvement in the firm's information environment is the most important driver of the positive price effects for companies cross-listed on US hosts. We also find that cross-listing activity prior to a firm's own listing has a significant but different impact on the two channels. With more home country cross-listing activity, the positive price effects associated with the segmentation hypothesis decrease, while the influence of higher investor recognition is heightened. Better firm information 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. This supports the view that US markets play a distinctive role with respect to preexisting information frictions.

***Keywords:*** cross-listing, depositary receipt, segmentation, investor recognition, price impact, event study, ADR, GDR

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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; Stulz, 1999) or differential accounting disclosure requirements (Fuerst, 1998) still results in what we could call a non-indifference between domestic and foreign listing locations.

Companies that can overcome or mitigate market frictions through cross-listing are expected to experience positive price effects. While some authors still debate the economic relevance and the permanent nature of the effects of cross-listings (Karolyi, 1998; Sarkissian and Schill, 2009; Gozzi et al., 2008; King and Segal, 2009) it is undisputed that cross-listing companies experience positive price reactions to these days. This paper investigates whether those positive price effects are related to the decrease in firms' segmentation 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 of incomplete risk sharing, international asset pricing under mild financial market segmentation (Errunza and Losq, 1985) and asset pricing under incomplete information (Merton, 1987).

Under both hypotheses, a positive price effect upon listing indicates a decrease in expected returns. Foerster and Karolyi (1999) already used a similar framework but did not differentiate between the two channels. Our additional contribution is thus to uncover whether the price effects have differed for companies that have cross-listed at different times, given that the extent of market frictions has likely changed from the time of that article. Indeed we expect changes in explicit and implicit investment barriers to be linked to the breadth of the existing cross-listing activity of the home country prior to a company's own listing. With more cross-listing activity, the importance of the segmentation channel is bound to lessen while that of the information channel to increase.

We investigate the price impact for a hand-collected sample of 645 cross-listings of developed and emerging markets from 1980 to 2011 and relate it to the cross-listing activity of more than 1,800 companies. Cross-listing studies are constrained by data availability in both the time-series and cross-sectional dimension and valuable information is often lost because of lack price or other company data. Our measure of cross-listing activity does not require price or other piece of information that commonly shrinks datasets: we simply add sequentially the number of companies with an active cross-listing from the same country prior to a cross-listing event. The analysis helps to determine whether the *segmentation hypothesis* is a relevant driver of price effects, whether the *improvement in the firm information* subsumes price effects coming from the diversification potential, and to what extent the cross-listing activity from the home country of the underlying security impacts both channels. To our knowledge we are the first to look at the impact of sequencing in cross-listing activity on some of the existing explanations for the price effects.

Our rigorous measure of a firm's segmentation prior to cross-listing is derived from Errunza and Losq (1985). 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. Therefore we use the correlation between an about-to-be cross-listed firm and other securities eligible to global investors and traded on host markets. This is measure is consistent with the extent of the firm's financial segmentation. Compared to unconditional market-wide correlation proxies, our firm-level measure of diversification potential is less affected by the over-estimation bias documented in Errunza et al. (1999) and Carrieri et al. (2007), allowing to more accurately infer the contribution of financial segmentation in the valuation benefits from cross-listing. In contrast with previous research, our estimate is also time-consistent since it accounts for a firm's segmentation and diversification potential prior to its cross-listing. Moreover, by taking in consideration the sequencing in cross-listings, we fully account for home-country cross-listing activity that preceded a firm's cross-listing, as we expect the benefits to change as more home-country securities become available on foreign markets through the years.

Since the positive share price reactions have continued despite the erosion overtime of explicit barriers, the cross-listing literature has offered alternative explanations to segmentation. A growing body of literature has recently developed, attributing the positive effects

documented to these days for cross-listings to expectations of increased cash flows. These benefits would come from the "bonding" of companies to the standards of the host markets (see Coffee (1999, 2002)) that will bring reduction of agency costs and information asymmetry between managers or large shareholders and minority shareholders (Stulz, 1999). Doidge et al. (2004) 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), relaxation of capital constraints (Reese and Weisbach, 2002), improvement in the firms' access to external financing (Lins et al., 2005), higher valuation of excess cash holdings (Frésard and Salva, 2010). In general, these papers find it significantly at play for companies from emerging markets, with larger improvements associated with poor home country investor protection. However, as Karolyi (2006) points out, the bonding hypothesis and the segmentation hypothesis are not mutually exclusive.

While explicit barriers have decreased overtime, implicit barriers such as information flow, are still likely to represent an hindrance to international risk sharing. We follow Merton's asset pricing under incomplete information and analyze the impact from changes in analyst coverage. Using foreign listings on *NYSE* and *LSE*, Baker et al. (2002) show that analyst coverage of the cross-listed firm 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 the sequencing of cross-listing activity from the home country. Indeed Merton (1987) points out that with the progressive improvement in the firm's incomplete information there will be two opposing effects. On the one hand, the cost of finding out about a security will be lower if an investor already knows about other correlated securities, perhaps from the same industry. On the other hand, for that investor the diversification benefits from finding out about that security will also be reduced. Investors with access to foreign securities already eligible on global markets are faced exactly with this trade-off when they learn about an additional about-to-be cross-listed company.

With the cross-section of all firms, our results show overall support for both hypotheses. Resolution of investment barriers – firm-level segmentation – or a decrease of firm's imperfect

information are linked to the positive share reactions. When we condition on the sequencing in cross-listing activity, we find that it also has a significant impact. Specifically, if there are more cross-listings from the same country, the positive price reactions associated with the segmentation hypothesis are smaller. On the other hand, with higher cross-listing activity from the same country, the impact of higher investor recognition on price effects strengthens. The investor recognition hypothesis is more significant for firms from developed markets, meanwhile the segmentation argument is highly supported for emerging market firms. 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. The latter effect is substantially stronger for firms opting to cross-list on US host markets, including emerging market firms.

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. Foerster and Karolyi (1993) show that Canadian cross-listings in the US more than double their aggregate trading volume and Smith and Sofianos (1997) 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 Schmukler, 2006, 2007; Domowitz et al., 1998; Fernandes, 2009). In our tests of improvement in incomplete risk sharing, we control for the alternative hypotheses.

The rest of the paper is organized as follows: Section 2 explains the data collection process, the sequencing of cross-listings and the estimation of the price impact, Section 3 introduces the theoretical background and presents the empirical model, Section 4 discusses the results for the univariate tests on our main independent variables and for the full model. Concluding comments to this paper are given in Section 5.

## 2 Data and cross-listing activity

Cross-listing is a corporate decision to apply for a secondary listing of shares on an foreign exchange (host exchange). Cross-listing can either be carried through the issuance of "Depositary Receipts" representative of underlying home-market equity shares, or through the issue of common shares on this secondary international exchange. The cross-listed company

has to comply with the set of rules of the host exchange. Eventually, it can be treated on par with the with domestic companies or have a specific international status.[1]

### 2.1 Data collection

The study at hand builds on a hand-collected datatabase covering 41 developed and emerging countries, resulting in 1,827 cross-listings placed in five major international stock exchanges: US markets (*NYSE*, *AMEX*, *Nasdaq*), *London Stock Exchange* (henceforth *LSE*) and *Luxembourg Stock Exchange* (henceforth *LuxSE*). Only exchange-listed instruments are included: ordinary shares, Level II and Level III ADRs traded on US markets, and GDRs for other markets.[2] As no unique data provider exists for cross-listings, we identified candidates from on-line files maintained by major depositary banks: *The Bank of New York/Mellon*, *Citibank Depositary Services*, *Deutsche Bank* and *JP Morgan*.[3] The importance of cross-listing activity being one of the main center of attention in our research question, this study genuinely builds on the recomposed historical developments and chronology for each cross-listing program. We keep track of possible delisting dates or dates of transfer to non-exchange-listed segments, by using *Citibank* files, and by performing systematic searches in *Datastream*, *CRSP*, *LSE* and *LuxSE* website.

Table 1, Panel A reports the distribution of identified cross-listings by home country (hereafter referred as the *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).

[ INSERT TABLE 1 AROUND HERE ]

[ INSERT TABLE 2 AROUND HERE ]

The largest population of identified cross-listings comes from U.K. (197), Canada (196) and India (168). Indian companies are also the most represented on non-US host stock

[1] Level III cross-listings on US exchanges are an example of the first case, while the international segment on the London Stock Exchange and reporting exemptions for Level II US cross-listings illustrate the second one. For a detailed description of the cross-listing process and associated legal requirements, please refer to Karolyi (1998).

[2] Cross-listings can also be Over-The-Counter instruments (Level I ADRs) or private placements reserved to Qualified Institutional Buyers (Rule 144A ADRs / GDRs).

[3] These source files exhibit some survivorship bias, as the depositary banks delete firms that delist from their records. 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.

exchanges (24.75% of the total number of cross-listings on non-US hosts), followed by Irish and Taiwanese firms. On US exchanges, the most represented countries for cross-listings are U.K. (197) and Canada (172), followed by Israel (110) and China (106). On the other hand, 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 emerging market 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 event date is the cross-listing date (first trading day on the host exchange).[4] We perform extensive cross-checks on this date across our data sources. The 1,827 identified cross-listing events span over a period of 86 years for companies from developed markets (76 years for emerging markets). The majority of cross-listings are clustered over the period 1990-2011. We observe that the last decade has been more important for emerging market firms and non-US hosts, while the 1990-1999 decade records the highest proportion of developed market firms cross-listing on US exchanges.

The methodology to extract the price reaction requires returns data of home market underlying security for a full two-years period around the cross-listing date (see Section 2.3). This criteria is met for 915 cross-listings, for which USD-denominated total returns series are collected from *Thomson Datastream*. Availability of analyst coverage and controls puts another restriction on the identified set of cross-listings. Analyst data is retrieved from the *Institutional Brokers' Estimate System* (henceforth I/B/E/S) database. We search for the company in each of the North-American and International detail files. The matching from our *studied* sample companies within the I/B/E/S database is done through an ad-hoc procedure.[5] The coverage of the International detail file provided by I/B/E/S starts in 1987, while the North American files collects data starting 1976, explaining a large part of the losses in the earlier part of the time series.

The final sample of 645 cross-listings meeting these criteria is the *studied sample*. Panel B

[4] As in many other studies, relying on announcement dates would substantially reduce the sample. 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.

[5] We search successively by full- and part of- CUSIP/SEDOL, firm name and fragments of firm name in attempting to match the different possibilities of abbreviations in force in I/B/E/S. The retrieved identified set is then manually post-treated: according to the location (the first alpha-characters of the I/B/E/S CUSIP code), then manually screened on name.

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 returns and analyst data (Australia, Japan, Netherlands, U.K.), or because the identified cases contain a large number of cross-listings for which we cannot access returns (China) or find the underlying security in the home market (Israel).[6] Overall, emerging market 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 *studied* sample starts later than the *identified* sample. Cross-listings from developed markets begin in 1980 while the earliest date for cross-listings from emerging markets is 1990. The period 1990-1999 still contains the largest portion of cross-listings.

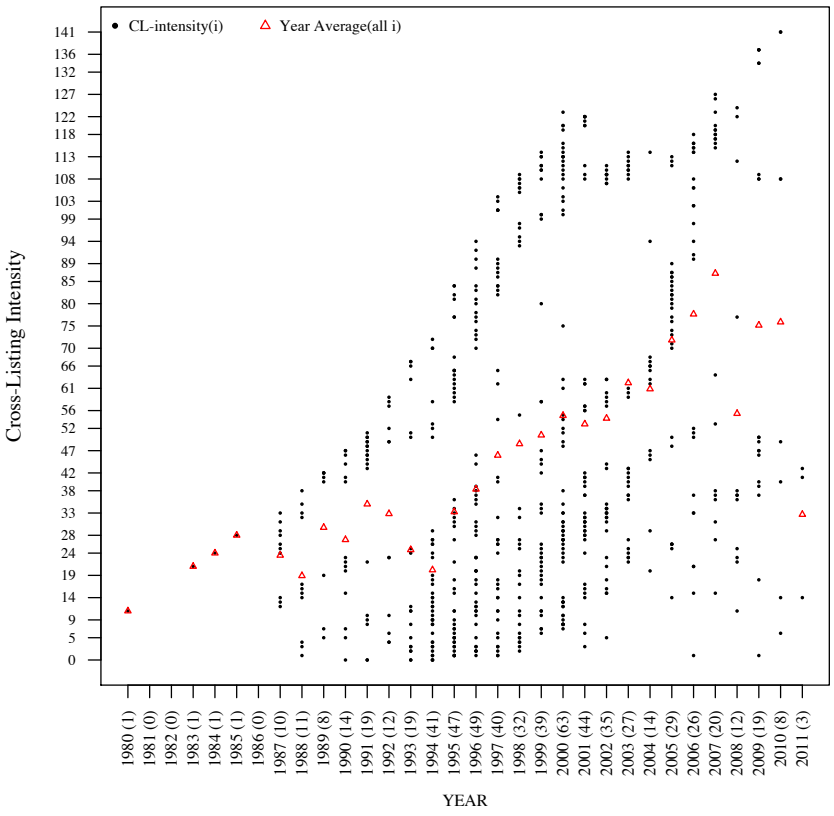
### 2.2 Cross-listing intensity

The requirements on price and analyst data cause the *studied sample* to shrink from the *identified sample* by about two thirds. Nevertheless we do use all the companies in the latter sample in constructing the measure of cross-listing activity, *CL-intensity*. From the data of the *identified sample* in Panel A of Table 1 we compute for each firm the sequencing of cross-listings from the same home country, *i.e.* the number of cross-listings *active* at the date of the firm's own cross-listing. For each firm, this variable represents a time-specific assessment of the cross-listing activity at the home country level by the time of each firm's listing. Thus although the companies in the *identified sample* are not part of the *studied sample* as they have no return or analyst information, they are nonetheless useful to construct the sequencing proxy. For example, even if we find no analyst recommendation pre- or post-listing and therefore exclude the company from the *studied sample*, we still retain the information about the listing event of this company in the *CL-intensity* variable. Figure 1 shows a plot of the *CL-intensity* variable presented for each company based on its listing year.

This variable has a mean (median) of 46.2 (36) across all companies in the studied sample, with a value of zero for eight companies from Belgium, Chile, Colombia, Korea, Sri Lanka, Taiwan and Turkey that based on our data collection are the first cross-listing from their home country and a maximum value of 139 for an Indian company listing on *LSE* in 2010.

[6] Availability of controls for share turnover also put an additional filter on some countries, for instance Ireland. For a description of controls see at the end of Section 3.1.

**Figure 1:** Cross-listing Intensity for all companies by year




The year average across the whole sample reveals a positive trend, which is to be expected given the increasing popularity of cross-listing. However it is important to point out that the proxy is firm specific, constructed to account for the sequencing of listings as well as delistings from the same country. As a result, it is not monotonically increasing to the end of the sample period for all companies in any given country.

## 2.3 Summary statistics and risk adjusted returns

This paper considers the price effects over market equilibrium occurring with a cross-listing event. As cost of capital changes are notably difficult to measure, we concentrate on price effects taken as abnormal returns with respect to a risk-adjusted market model.[7]

[7] Some attempt to reliably estimate cost of capital changes in the context of cross-listing are undertaken by Hail and Leuz (2009), based on implied cost of capital anchored in an accounting-based methodology. However, as argued by Roosenboom and van Dijk (2009), the long estimation windows of such metrics, typically several years, cannot easily be matched with the change in variables, that are instead identified in the short term. Focused on a longer horizon, cost of capital effects are then hard to relate to the magnitude of changes in the variables.

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 before listing (weeks -52 to -1). We compute returns on a weekly basis, Wednesday to Wednesday. We use USD-denominated total returns series from *Datastream* and compute returns in excess of the weekly rate of the 1-month US Treasury bill.[8]

[ INSERT TABLE 3 AROUND HERE ]

The numbers reported in Panel A are averages computed from the time-series means of the cross-section of firms. The average weekly return for all firms is 0.79 %. The returns are significantly higher for emerging markets, in line with established facts, and they are statistically different from the average returns of developed market firms. The larger proportion of emerging market 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, confirming a pattern observed in the previous literature.

To capture the abnormal performance from price effects, we estimate a two-factor market model for a two-year period centered around the week of cross-listing, following Foerster and Karolyi (1999).[9] As in that paper, we use a risk-adjusted market model. We run a time-series regression for each company, allowing for changes in risk exposures to local and world market returns since it is likely that the sensitivity of the company's returns to risk factors will change with the cross-listing event.[10] The risk model estimates $\alpha_{PRE,i}$, the abnormal returns in the pre-listing period, as well as changes in abnormal returns in the post-listing period.

Panel B of Table 3 reports the cross-sectional average of the $\alpha_{PRE,i}$ from each 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 0.54 is statistically significant for the pre-listing period.[11] Our alpha estimates are remarkably close to the

[8] The 1-month T-bill series are retrieved from Prof. K. French online data library.

[9] Details on the methodology can be found in Foerster and Karolyi (1999). They 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 on US exchanges. The patterns of price effects seem to vary depending on the destination markets, pointing to a higher effect for *NYSE* listings over other US cross-listings (exchange listed and OTC).

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

[11] In the risk adjusted regression we also find a significant $\alpha_{PST,i}$. Other authors report 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)).

estimates of the pooled regression in Foerster and Karolyi (1999), although our sample also extends to cross-listings from later periods as well from emerging markets. That paper finds some differences among US exchanges that are however not statistically significant. We also find no statistical difference between alphas of firms from US and non-US hosts on the whole sample, except for pre-listing abnormal performance of earlier cross-listings. Finally, our sample does not present statistical differences between cross-listings from developed markets and emerging markets in any period.

## 3 Theoretical background and empirical model

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 international risk sharing. Cross-listing on foreign markets has thus been proposed as a way to circumvent financial segmentation (Stapleton and Subrahmanyam, 1977; Eun and Janakiramanan, 1986). Asset pricing models under investment barriers then predict large positive returns for cross-listing companies during the liberalization period, leading to revaluation and a decrease in the company's cost of capital.[12]

The mild segmentation model of Errunza and Losq (1985) explains the additional risk premium through the conditional covariance between a security and the domestic market portfolio, given all securities that are eligible to be traded 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. We thus use the correlation of the returns of each cross-listed company with a diversification portfolio obtained from the returns of other securities already

[12] Early empirical studies of cross-listings report some evidence of pre-listing positive abnormal returns (run-up), post-listing negative abnormal returns, and lower impact for Canadian companies, supporting segmentation (Alexander et al., 1988; Foerster and Karolyi, 1993; Jayaraman et al., 1993). With US cross-listings, 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 higher reactions for exchange listings (Level II and Level III ADRs) and for firms coming from emerging markets. 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.

traded on global markets before the listing week as measure of segmentation at the firm level. Section 4.1 summarizes the methodological approach to estimate such correlations.

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 impacts implicit barriers, by improving the firm 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. Specifically, returns are shown to depend on a shadow cost of information, a firm specific factor that depends on incomplete information. The lower this awareness, the higher is the additional premium, proportional to the idiosyncratic risk of the company. To the extent that cross-listing can remove this imperfection and increase investors' awareness towards the security, the pattern of price effects around cross-listing will exhibit abnormal returns linked to a decrease in the shadow cost of information.[13] The company's premium for the shadow cost of information is proportional to $\lambda_i$, a factor that depends on the aggregate risk aversion, the firm's idiosyncratic risk, the firm's relative size and the proportion of the firm's investor base relative to the total number of investors. The change in the factor capturing the investor recognition is what matters for price effects.

In Section 3.1 we explain our cross-sectional tests and relate them with these theoretical predictions.

### 3.1 Tests of financial segmentation and investors' recognition

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

$$\alpha_{PRE,i} = \phi_1 + \phi_2\, CORR_{DIV,i} + \phi_3\, \Delta\lambda_i + \phi_4\, LIQ_i + \phi_5\, GOV_i + \phi_6\, SIZE_i + \phi_7\, DIST_i + \phi_8\, WDI_i + \phi_9\, \text{CL-intensity}_i + \phi_{10}\, \text{CL-intensity}_i \times CORR_{DIV,i} + \phi_{11}\, \text{CL-intensity}_i \times \Delta\lambda_i + \upsilon_i \quad (1)$$

where $\alpha_{PRE,i}$ represents price effects as abnormal returns from the estimation for each firm $i$ in our *studied sample* of the risk market model discussed in Section 2.3, $CORR_{DIV,i}$ is the unconditional correlation of firm $i$'s returns with its diversification portfolio built from some of the companies in the *identified sample* with price availability, and $\Delta\lambda_i$ is our measure

[13] 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 of the home country with cross-listings.

of the change in firm $i$'s information environment.[14] 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.[15]

A test of the importance of the segmentation hypothesis implies a negative and significant coefficient for $\phi_2$. 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's information, proxied by an increase in analyst coverage, through the significance of the $\phi_3$ 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 (1987) model.

The sequencing of cross-listing activity (*CL-intensity*) can offer additional insights on our two main hypotheses. First, consider it in play for the segmentation 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 become at some point negligible. 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. The theoretical model implies that the importance of the segmentation through the super-risk premium is conditional on all eligible securities traded in global (host) markets. We thus take into account the sequencing of cross-listing activity through the interaction of *CL-intensity* with $CORR_{DIV,i}$. As a result, we can more precisely assess the conditional impact of all eligible securities on the price effects and overcome our limitations in data and methodology, as explained later in Section 4.1. With a positive correlation for almost all the firms in our studied sample, we expect the impact of the components of the interaction $\phi_2 + \phi_{10}\text{CL-intensity}_i \times CORR_{DIV,i}$ to be negative. That is, the price effects associated with asset correlations are dampened when we fully condition on a higher level of *CL-intensity*.

Now consider the impact of the sequencing of cross-listings for the investor recognition

[14] The fact that we use the variable $\alpha_{PRE,i}$ estimated from a first-pass regression can cause an error-in-variable problem. The standard errors of the cross-sectional estimates in Eq. (1) can be inflated. This, in turn, can bias against finding significance, therefore we are confident that the effects we uncover are not spurious.

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

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 other financial 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 $\phi_3 + \phi_{11}\text{CL-intensity}_i \times \Delta\lambda_i$ should become more negative. In other words, the price impact of the resolution of shadow cost of information conditional on higher *CL-intensity* 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. A positive impact from the interaction model would be consistent with their result.

In summary, both hypotheses predict that price effects upon cross-listing should be positive. However, the extent of cross-listing activity preceding the listing should work in opposite direction, allowing us to distinguish between the channels at play. We expect a decreasing impact from further decline in segmentation and an increasing impact from progressive improvement in the firm's information environment. This in turn implies that although re-evaluation benefits accruing to cross-listings from the lowering of explicit barriers are significantly reduced, those related to implicit barriers still matter.

In our regressions, we control for potential influence of other firm and country characteristics.

Given the previous evidence related to bonding arguments, we 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.[16] Based on the previous arguments, we expect a negative coefficient on this variable.

It is also 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 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. 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.

The literature has addressed geographical proximity of the home- and host-country. It has been shown to impact cross-listing decisions (see Sarkissian and Schill (2004)), abnormal returns (Sarkissian and Schill (2009)), trading activity (Smith and Sofianos (1997) and Hailling et al. (2008)). Markets that are geographically closer are often found to be more correlated, as evidenced by the high correlation coefficients between market-wide correlation and distance showed in Sarkissian and Schill (2009). Geographic distance can also hinder information gathering for international investors. It can therefore have a confounding effect on both the proxy for segmentation hypothesis and the one for investor recognition. To control for such influences, we introduce $DIST_i$, accounting for the *Great Circle Distance*, the shortest land distance between the capital cities of the two countries (originated by Coval and Moskowitz (1999)). It is expressed in thousand of kilometers.

The change in investors' recognition may be influenced by the overall country-wide information infrastructure and communication channels. To distinguish the firm financial information gathering from the information environment across-countries and its development across-time, we include a control for the density of the available telecommunication infrastructure in the firm's home market, by selecting subscription to *mobile phone* and *telephone*

[16] 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%.

*land lines*, along with *internet use* rate, sourced from the *World Development Indicators* of the World Bank database. For each cross-listing, we construct $WDI_i$ as the average percentage of rate of these three rates, expressed in percent of the population of the home country in the year of the cross-listing.

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

# 4 Results

## 4.1 Univariate tests on firm-level financial 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.[17] 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 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 about-to-be cross-listed firm 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 a regression of weekly returns of the about-to-

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

be cross-listed security, $r_{i,t}$, on the returns of the world market and ten global industrial indices (*Thomson Datastream* Level-1 ICB classification) during the 52 weeks before the listing week. We use a stepwise procedure with forward and backward inclusion to select in the specification those assets that minimize the Akaike Information Criteria and obtain, $\widehat{r}_{G,t}$ the Global Diversification portfolio. We then regress $r_{i,t}$ on $\widehat{r}_{G,t}$ and returns of 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*. Due to the limited time-series of returns 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 regression is the return on $\widehat{r}_{DIV,t}$, the Augmented Diversification portfolio that is most correlated with the home market returns of security *i* prior to its cross-listing.

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 model Eq. (1) with the help of the interaction with the *CL-intensity* variable.

[ INSERT TABLE 4 AROUND HERE ]

Table 4 reports the 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 stepwise selection procedure across all firms always picks the world market index while the

[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.

average number of global industries represented in the portfolios is 2.39. The average correlation of these portfolios with the returns of each firm is 0.50, ranging from 0.46 for the emerging markets to 0.53 for the developed markets. We find that developed market firms load more strongly on the global industries than firms in emerging markets. Not surprisingly, the average correlation of each firm with its Augmented Diversification portfolio is substantially higher at 0.63. The vast majority of the firms has five preceding cross-listings in the Augmented Diversification portfolio, since the average number of preceding cross-listings is 4.55 across all firms. Unlike the averages of the Global Diversification portfolios, there is less 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 emerging and developed markets companies and between US hosts and non-US hosts listings. On the other hand, the test fails to find any significant difference between the correlations for the Augmented Diversification portfolios of emerging and developed markets as well between the subsamples based on destination exchange split (US vs. non-US).

Panel B of Table 4 summarizes 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 Chile or Korea, these dates coincide, thus with a lower correlation, the diversification potential of the first cross-listing from this country in the *studied sample* is likely to be higher as its diversification portfolio is constructed only from the 'global' securities. In other cases, such as India, the first studied 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 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 some variation in the average correlations across countries and across listing periods. Similar to what is documented at the market level in Errunza et al. (1999), some firms from developed markets have higher correlations in the first decade when the weight of global industries is larger. In the Eighties, the correlation with the Global Diversification portfolio for many of these companies is relatively higher because of the large weight of developed market firms in global industry indices. In contrast to this earliest period, most firms of the *studied sample* that listed in the Nineties only had a few cross-listings from the same country that

were already trading on host markets. As a result in this decade, 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 during the latest decade for emerging market firms. This is consistent with a lowering of explicit barriers during the Nineties, resulting in a general decrease in segmentation.

### 4.2 Univariate tests on investors' recognition

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

$$\Delta\lambda_i = \sigma^2_{\epsilon_{i,t}} RMV_i \left( \frac{1}{A_i^{PST}} - \frac{1}{A_i^{PRE}} \right) \tag{2}$$

where $\sigma^2_{\epsilon_{i,t}}$ is the residual variance of the risk market model that estimates abnormal returns as presented in Section 2.3 for each firm $i$, $RMV_i$ 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.

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.

[19] The USD-market value of the cross-listed companies and of the world index is extracted from *Datastream*.
[20] We follow Kadlec and McConnell (1994) for the construction of our empirical proxy and neglect the aggregate risk aversion factor.
[21] Analyst identification codes may refer to a sector rather than to a given person (especially for international recommendations), or be "undisclosed" by the brokerage firm and therefore coded as "0".

[ INSERT TABLE 5 AROUND HERE ]

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 in all periods, while Panel B presents them split by decade. The results are separated according to the origin of the cross-listing firm (DMs or EMs) and whether the destination venue is a US host or non-US host market.

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 14.8 to 17.6. The increase is relatively larger for emerging market firms (+77.5%) versus developed market firms (+43.5%) and for firms listing on US hosts (+61.7%) compared to those listing on non-US hosts (+53.3%). When looking separately at pre- and post- listing levels of analyst following, the univariate tests indicate that emerging market firms on US hosts have larger analyst following than emerging market firms listing outside the US in both periods, moreover the change in analysts following is significantly higher for the firms targeting US exchanges. Panel B considers the sample split by different decades. The increases in analyst coverage are found significant across all sub-categories of firms across time. We note that companies listed in the first decade enjoy both the highest coverage of analysts and the largest increase across all decades. Firms coming from emerging markets have a higher increase than developed market firms, by far, in any subperiods. In comparison, the firms that cross-list in the US are found to have a smaller increase in the first decade, although pre- and post- analyst following is not found to differ significantly. US cross-listed firms in the decade 1990-1999 then have a larger increase in analyst coverage. In the decade 2000-2011, the changes are very close, with smaller increase among US hosts , but do not differ statistically. Firms cross-listing in the latest decade show a percentage change that is only slightly higher than the one of 1990-1999, with similar patters

across the US / non-US classification. Thus the increase in the post-listing periods cannot be attributed to expanded data coverage by I/B/E/S in the latest years.[22]

### 4.3 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 from risk market model as presented in Section 2.3. 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 645 cross-listings.

[ INSERT TABLE 6 AROUND HERE ]

Panel A reports the unconditional and conditional analysis of each of the risk sharing hypotheses separately. The first regression includes as independent variable the measure of the diversification potential offered by the underlying security, which is consistent with its degree of financial 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 as independent variable only the proxy for the change in firm $i$'s shadow cost of information, $\Delta\lambda_i$. The parameter estimate is negative and also strongly significant. 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.

This result uncovers a general association across the cross-section of securities but does not capture other effects linked to the quantity and sequencing 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. In other word, by estimating only an average association between the variables, we cannot fully

[22] Detailed home country classification reveals that analyst coverage generally increases upon cross-listing. We do find instances with lower mean and median after cross-listing, for example for firms from New Zealand, Brazil, Spain or Switzerland. None of the instances of decrease in the number of analysts is statistically significant, in contrast to the vast majority of the increases.

discriminate the effect of prior listings from the effect of subsequent ones, at the same level of the independent variable.

Models (1a) and (2a) expand our analysis in this direction. We investigate whether the association between the variables varies depending on the level of cross-listing activity already present in the home country of the underlying security through an interaction term with the *CL-intensity*. With the help of the interaction variable we can uncover how the association changes with different level of cross-listing activity in the *identified sample*, even though we have no price or analyst information on these companies. This approach can provide for each firm of the *studied sample* a time-specific assessment linked to characteristics computed at the country-level.

For each model, we report the estimated coefficients with significance associated to the standard t-statistics. In addition, below, we report from the same regression the value of the estimated coefficient of the interaction in the (a) models, evaluated at quantiles and at the average of the distribution of *CL-intensity*. The values for the interaction measure the marginal effects of our two main independent variables when conditioning across the range of cross-listing activity and also their statistical significance over the range.[23] It is indeed difficult to properly evaluate conditional hypotheses with continuous variables using only the information that is regularly provided in result tables. Table 6, Panel A remedies to these shortcomings.

In model (1a) the coefficient $\phi_2$ that measures the effect of diversification at zero *CL-intensity* is negative but not significant and it is decreasing with more prior cross-listings, turning to be 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 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. Our results are in contrast with Lee (2004) who cannot find in his dataset of 63 cross-listings that earlier announcement returns are on average significantly larger from later announcement, and concludes that the segmentation hypothesis

[23] P-values are obtained from t-statistics with standard errors calculated from the components of the marginal coefficient, that is:
$\widehat{\sigma}\left(\frac{\partial_{\alpha_{PRE,i}}}{\partial_{CORR_{DIV,i}}}\right) = \sqrt{var\left(\hat{\phi_2}\right) + \text{CL-intensity}_i^2 \; var\left(\hat{\phi_{10}}\right) + 2 \text{ CL-intensity}_i \; cov\left(\hat{\phi_2}, \hat{\phi_{10}}\right)}$ and similarly computed for $\Delta\lambda_i$ with $\hat{\phi_3}$ and $\hat{\phi_{11}}$.

is rejected. However the analysis in that paper is an unconditional analysis of abnormal returns. Our findings are more in line with the evidence in 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 effects. The interaction of $\Delta\lambda_i$ with *CL-intensity* addresses this issue. In model (2a) the reported values for this interaction range from $-0.3120$ to $-0.9814$. 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. We see this as an 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 that leverages the firm-level improvements.[24]

In Panel B we expand the analysis with the addition of controls. In models (3) and (4) we add, respectively to models (1) and (2), controls for liquidity and size at the firm level and for corporate governance, geographical proximity and information environment at the country level. The signs of coefficients for both $CORR_{DIV,i}$ and for $\Delta\lambda_i$ in the two separate regressions are still negative and significant, while the size of the coefficient for the correlation is half that of model (1). The constant is positive and significant in both cases, and the $R^2$s almost double for the expanded models. The sign of the coefficient on the liquidity control is consistently positive, with a higher significance level in model (4). As Domowitz et al. (1998) find out, there are opposite effects on the liquidity of cross-listed shares with reduction in trading costs but also order flow migration. Considering the mixed evidence in the literature on liquidity effects and the challenges in measurement, our results seem to suggest that more liquid firms will experience higher price effects than less actively traded

[24] Fernandes and Ferreira (2008) find that more openness of the market due to liberalization moves enhances the information environment quality, with ADRs issuance having a significant effect among the potential liberalization moves. Bekaert and Harvey (2000) and Carrieri et al. (2013) take the number of ADRs (resp. CLs) as a proxy of market openness.

ones. This is at odd with the liquidity hypothesis that less liquid firms should experience larger re-evaluation, although in line with what is reported in Roosenboom and van Dijk (2009). 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 that would materialize in a negative coefficient. 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)). The control for the information infrastructure ($WDI_i$) bears a significantly positive coefficient in both specifications. Definition of a precise impact for this variable is indeed complicated and its influence could be postulated to go in both directions. On the one hand, firms from countries with poor communication infrastructure are expected to benefits the most from cross-listings on host markets in countries with better infrastructure, leading to a negative coefficient on the control. On the other hand, better telecommunication linkages in the firm's home country may support/enhance the change in firm's visibility that is produced through the cross-listing. The proxy should therefore bear a positive sign. The fact that the coefficient does not change much between the two specifications and model (5) suggests that it might actually capture the influence of better communication networks per se on the price reaction of cross-listing firms.

Model (5) considers both main hypotheses together with all the controls discussed above. We confirm the sign of the main variables but the coefficient on the correlation is further reduced and the investor recognition is the only variable of interest that remains significant. We detect no material change for the estimated influences of the control variables with respect to the previous two specifications. With an adjusted $R^2$ just above 15 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 adjusted $R^2$ in the range of 0.2% and 4% in comparable (unconditional) 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 generates 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.

Finally in model (6) we consider the conditional relation simultaneously for both hypotheses. Recall that Merton had pointed out that two opposite effects would be in play with the progressive improvement in risk sharing: lower marginal information cost since investors already know of correlated securities, yet less diversification benefits. The results of the conditional hypothesis of model (6) confirm exactly this argument. The country component serves as an enhancement of the change in shadow cost of information that occur at the firm level. With the full cross-section of firms, the impact from both channel is significant and evolving in the expected direction. In other words, with increasing cross-listing activity the positive price reaction from overcoming barriers from segmentation is smaller while the reaction that could be attributed to overcoming barriers from information is larger. It is also interesting to note that while the segmentation was not significant on average in model (5), it is significant when we condition on pre-existing cross-listing activity.

The $R^2$ of model (6) at 20.6 percent is almost 1.5 times the $R^2$ of the corresponding linear-additive model (5). Similarly in models (1a) and (2a) the $R^2$s substantially improve from (1) and (2). The constant in model (6) is still positive and this time not significant. 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 models (1) to (5) can be enhanced by conditioning on characteristics that are common across the country of domicile.

### 4.4 Where does incomplete information matter the most?

The results so far suggest that the investor recognition hypothesis is strongly supported. To refine our understanding of this hypothesis, we extend the analysis in a number of directions. We look at possible differences due to the size of the company, the country of origin, the level of corporate governance and the listing location. The results are reported in Table 7. We only

report the additive models (3) and (4) with each of the main independent variables and the controls, plus the interaction model (6) with the schedule of the *CL-intensity* distribution.

[ INSERT TABLE 7 AROUND HERE ]

Within the full sample of firms of Table 6 we noticed that the control for size is always significant with a negative loading, pointing to higher price effects for relatively smaller companies. Interestingly these are less expected to cross-list, given that cross-listing is more common among large capitalization company (see Saudagaran (1988); Pagano et al. (2002); Sarkissian and Schill (2004)). 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). We thus split the sample based on the market capitalization of the company as we expect that incomplete information is likely different in these subsets.

In Panel A of Table 7 we present results for listing firms below and above the median of the distribution of USD-denominated market capitalization at the time of their cross-listing. The coefficients for $\Delta\lambda_i$ are negative in models (4) and equally significant in both subsamples, however at -1.737, the magnitude of the coefficient for small caps is more than four times that of the larger firms. This pattern is also confirmed in the interaction model (6). For the subset of large companies, the evidence on the improvement in the firm's information environment is similar to the evidence derived on the whole sample sample. For small companies, the conditional coefficient is again larger by an order of magnitude but the association with the abnormal returns is not heightened by the conditional relationship. Thus while the improvement in the firm's information is more important in economic terms for small-cap companies that are likely to be less known to investors, preceding cross-listing activity does not seem to contribute in alleviating the frictions. The firm segmentation is inversely related to the positive price effects but only significant in the subset of small firms, which is consistent with the evidence in Eun and Lee (2010) that small firms can enhance international diversification. In addition there are substantially less firms from emerging markets in the sub-sample of large caps.

We then run regressions that include emerging market companies listing on all hosts. Results are presented in Panel B of Table 7. We observe that the coefficients on our two main independent variables in the additive models (3) and (4) are of the expected sign, and that both are highly significant. The interaction model (6) reinforces the conclusion on the importance of the segmentation argument for emerging market firms at large and also supports our conjecture that the impact of prior cross-listing activity would dampen its benefits. 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 increases in significance over the most part of the range of the interaction variable, and is still marginally significant when the firm event is preceded by the highest numbers of previous cross-listings. This result once again prompts support for Merton's hypothesis.

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 emerging market firms that list on US hosts. For the remaining 174 companies, the segmentation hypothesis appears to be the only driver as we find no significant unconditional or conditional association with the variable capturing the incomplete information hypothesis. We infer that adding the emerging market firms listed on US hosts strengthens the statistical importance of the investor recognition hypothesis, although changes in analysts were equally significant for emerging market firms on US hosts and non-US hosts in the univariate tests. Indeed non-tabulated results of model (6) indicate that the relation among the companies in US hosts is strongly significant, and that the impact of improved information environment for the firm is increasing with prior cross-listings. These additional results also confirm that the significant influence of the pre-cross-listing segmentation for emerging market firms depends on firms listing outside the US.

Overall the evidence from Panel A and Panel B reveals that the information frictions do play a role in subsets where they are likely more binding, such as firms with small capitalization and firms from emerging markets, albeit only among those listing on US hosts. Indeed a large part of the cross-listing literature stresses the role of US capital markets in reducing agency costs and information asymmetry, "bonding" companies to a superior legal and disclosure environment. To investigate the importance of the investor protection framework 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 home country's Anti-Directors-Rights index, taken from Djankov et al. (2008).

The analysis of Table 7, Panel C for US listings reveals a pattern similar to the results of Panel A. For the companies below the median of the governance index, the coefficient in model (4) is negative and here marginally significant. Most importantly, the economic impact strengthens in the interaction model (6), and it becomes significant when the investor's awareness through other cross-listings increases. For firms coming from a good corporate governance background, the investor recognition is also found as a significant factor and its impact increases when the firm cross-lists in an environment where many cross-listings from its home country already exist.[25] However as in Panel A, the economic significance, as indicated by the magnitude of the coefficient of the shadow cost of information in the interaction model, is much smaller than for firms coming from countries with poor corporate governance. This suggests that the benefits from the improvement in the firm information environment channel are heightened where the need for stringent disclosure standards and greater transparency is the largest.

The coefficient related to the investor recognition channel for the firms listing on non-US hosts is negative and significant in the additive model (4), yet the insights from the conditioning model (6) are quite different. Indeed, non-tabulated results suggest that the decrease in the firm's shadow cost of information plays only a small role, that does not strengthen statistically with many previous cross-listings from the firm's home country. On the contrary, the interaction on the pre-cross-listing diversification potential metric is significantly negative and has the expected evolution. Thus, even for companies that are hindered by high information frictions, cross-listing outside the US does not seem to substantially remove these informational barriers.[26] In turn, this seems to point to an unique role for the US markets, with the channel from improvement in firm information working differently for emerging market companies listing on US hosts and those on non-US hosts.

In summary, US listed companies that are small, from developed markets and from countries with poor corporate governance are driving the results on the investor recognition, as we find within these subsets coefficients that are similar in direction and significance to those

[25] Unreported additional tests available upon request.

[26] Unreported splits considering only *LSE* and *LuxSE* show that the contribution of the economic importance of the information improvement comes more from *LSE*-listed firms than from those listed on *LuxSE*. Samples are relatively small (resp. 51 and 36 firms) to reliably judge the statistical significance.

in Table 6 with the whole sample.[27] Emerging markets companies are driving our results for positive price effects through the segmentation channel. Yet, we find evidence that price effects for emerging market companies listing on US hosts are associated also with the information channel. Within our sample, access to a better firm's information environment is then associated to positive price effects with stronger economic and statistical significance in the presence of reduced agency cost, and emerging market firms listing on US hosts help in establishing this result.

### 4.5 Further checks

To check the robustness of the diversification portfolios, we use a liquidity-based criteria as an 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 selection and for the rest 80 percent we do not find a pattern that can be attributed to a persistent bias. We thus have presented results based on the seniority criteria.

We run a check for the companies in the *studied sample* based on the firm-specific idiosyncratic risk. We split the firms below and above the median of the variance of the firms' residuals estimated from the risk return model of Section 2.3. We then re-estimate Eq. (1) for the whole sample and with the sub-samples of firms in emerging markets, developed markets, US hosts and non-US hosts. The analysis is qualitatively and statistically in line with Merton's prediction, with the decrease in incomplete information associated to abnormal returns only for the firms in the group above the median of idiosyncratic risk in all sub-samples. Instead the statistical significance of the decrease in segmentation is not conditional on firm-specific risk.

Given the acceleration of cross-listing activity throughout the years, a possible concern is that the *CL-intensity* variable or its interaction 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

[27] Most of the results within subsets that are in line with the evidence of Table 6 are not tabulated but available upon request.

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. In addition, in sub-sample analysis we find that for the 107 Canadian companies in our study the conditional impact of cross-listing activity on investors recognition is not monotonically increasing, despite a positive trend in cross-listing intensity through the years. Both observations lead us to conclude that the patterns in the interactions are not simply capturing a time-trend.

As a final observation, it is worth remembering that interaction models are symmetric, thus one can also look at the way the *CL-intensity* variable is modified when conditioning on the correlation or the investors recognition. In our previous analysis we were guided by the theory and thus we have discussed how *CL-intensity* modifies the tests for risk sharing. Nonetheless, it is easy to see, for example, what the marginal effects of *CL-intensity* are on the abnormal returns for different values of the correlations. The general message is of course unchanged. While there is a positive association between abnormal returns and increasing cross-listing activity, a finding much discussed in the literature, its impact is weakened by higher correlations among the cross-listings and other eligible securities.

# 5 Conclusion

Cross-listing is a policy decision with far reaching effects that finds in part its motivation in market frictions that hinder risk sharing. We investigate to what extent the decrease in international investment 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 for each firm at the country level.

For a sample of 645 cross-listings between 1980 to 2011 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, developed market and large capitalization firms experience price effects that are only supported by the change in their information environment. The US destination brings especially large effects from the improvements in investor awareness if the cross-listing firm is coming from a poor corporate governance environment, a result in line with what the agency costs and information asymmetry literature suggests. This evidence is further reinforced by the weak statistical significance of the improvement in investor awareness when the firms cross-list on non-US exchanges.

Our evidence suggests that when we also account for the sequencing of more than 1,800 cross-listings across countries and years, we find that the segmentation hypothesis is weakened by more intense activity prior to a company's own listing, as the diversification potential is eventually exhausted. Conversely, the conditional effect on the increase in firm information from country-level cross-listing activity is heightened and this result is confirmed also for smaller companies and emerging market companies that list on US hosts. However, higher investor awareness in combination with more cross-listing intensity does not lead to beneficial price effects for emerging market companies listing on non-US hosts, confirming the distinctive feature of US host markets with respect to the channel of information.

Despite becoming less crucial in overcoming barriers to international investment, the decision of a firm to cross-list can to these days have beneficial effects. These effects are in part associated with improvements in the firm information environment, also heightened by more intense cross-listing activity from the home country. Our evidence suggests that such policies reach beyond the company itself and can contribute to enhancements at the country level.

# References


Acharya, V. V. and Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics*, 77(2):375–410.

Alexander, G. J., Eun, C. S., and Janakiramanan, S. (1987). Asset pricing and dual listing on foreign capital markets: A note. *Journal of Finance*, 42(1):151–158.

Alexander, G. J., Eun, C. S., and Janakiramanan, S. (1988). International listings and stock returns: Some empirical evidence. *Journal of Financial & Quantitative Analysis*, 23(2):135–151.

Amihud, Y. and Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics*, 17(2):223–249.

Bae, K.-H., Bailey, W., and Mao, C. X. (2006). Stock market liberalization and the information environment. *Journal of International Money & Finance*, 25(3):404–428.

Bailey, W., Karolyi, G. A., and Salva, C. (2006). The economic consequences of increased disclosure: Evidence from international cross-listings. *Journal of Financial Economics*, 81(1):175–213.

Baker, H. K., Nofsinger, J. R., and Weaver, D. G. (2002). International cross-listing and visibility. *Journal of Financial & Quantitative Analysis*, 37(3):495–521.

Bekaert, G. and Harvey, C. R. (2000). Foreign speculators and emerging equity markets. *Journal of Finance*, 55(2):565–613.

Black, F. (1974). International capital market equilibrium with investment barriers. *Journal of Financial Economics*, 1(4):337–352.

Brambor, T., Clark, W. R., and Golder, M. (2006). Understanding interaction models: Improving empirical analyses. *Political Analysis*, 14(1):63–82.

Bris, A., Cantale, S., and Nishiotis, G. P. (2007). A breakdown of the valuation effects of international cross-listing. *European Financial Management*, 13(3):498–530.

Carrieri, F., Chaieb, I., and Errunza, V. (2013). Do implicit barriers matter for globalization. *Review of Financial Studies*, 26(7):1694–1739.

Carrieri, F., Errunza, V., and Hogan, K. (2007). Characterizing world market integration through time. *Journal of Financial & Quantitative Analysis*, 42(4):915–940.

Carrieri, F., Errunza, V., and Sarkissian, S. (2004). Industry risk and market integration. *Management Science*, 50(2):207–221.

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

Coffee, J. C. (2002). Racing towards the top?: The impact of cross-listings and stock market competition on international corporate governance. *Columbia Law Review*, 102(7):1757–1831.

Coval, J. D. and Moskowitz, T. J. (1999). Home bias at home: Local equity preference in domestic portfolios. *Journal of Finance*, 54(6):2045–2073.

Djankov, S., La Porta, R., Lopez-de Silanes, F., and Shleifer, A. (2008). The law and economics of self-dealing. *Journal of Financial Economics*, 88(3):430–465.

Doidge, C. (2004). U.S. cross-listings and the private benefits of control: Evidence from dual-class firms. *Journal of Financial Economics*, 72(3):519–553.

Doidge, C., Karolyi, G. A., and Stulz, R. M. (2004). Why are foreign firms listed in the U.S. worth more? *Journal of Financial Economics*, 71(2):205–239.

Domowitz, I., Glen, J., and Madhavan, A. (1998). International cross-listing and order flow migration: Evidence from an emerging market. *Journal of Finance*, 53(6):2001–2027.

Edison, H. J. and Warnock, F. E. (2004). U.S. investors' emerging market equity portfolios: A security-level analysis. *Review of Economics & Statistics*, 86(3):691–704.

Errunza, V., Hogan, K., and Hung, M.-W. (1999). Can the gains from international diversification be achieved without trading abroad? *Journal of Finance*, 54(6):2075–2107.

Errunza, V. and Losq, E. (1985). International asset pricing under mild segmentation: Theory and test. *Journal of Finance*, 40(1):105–124.

Errunza, V. and Miller, D. P. (2000). Market segmentation and the cost of capital in international equity markets. *Journal of Financial & Quantitative Analysis*, 35(4):577–600.

Eun, C. S. and Janakiramanan, S. (1986). A model of international asset pricing with a constraint on the foreign equity ownership. *Journal of Finance*, 41(4):897–914.

Eun, C. S. and Lee, J. (2010). Mean–variance convergence around the world. *Journal of Banking & Finance*, 34(4):856–870.

Eun, C. S., Wei, H., and Lai, S. (2008). International diversification with large- and small-cap stocks. *Journal of Financial & Quantitative Analysis*, 43(2):489–523.

Fernandes, N. (2009). Market liberalizations at the firm level: Spillovers from ADRs and implications for local markets. *Journal of International Money & Finance*, 28(2):293–321.

Fernandes, N. and Ferreira, M. A. (2008). Does international cross-listing improve the information environment. *Journal of Financial Economics*, 88(2):216–244.

Ferreira, M. A. and Matos, P. (2008). The colors of investors' money: The role of institutional investors around the world. *Journal of Financial Economics*, 88(3):499–533.

Foerster, S. R. and Karolyi, G. A. (1993). International listings of stocks: The case of Canada and the U.S. *Journal of International Business Studies*, 24(4):763–784.

Foerster, S. R. and Karolyi, G. A. (1999). The effects of market segmentation and investor recognition on asset prices: Evidence from foreign stocks listing in the United States. *Journal of Finance*, 54(3):981–1013.

Frésard, L. and Salva, C. (2010). The value of excess cash and corporate governance: Evidence from us cross-listings. *Journal of Financial Economics*, 98(2):359–384.

Fuerst, O. (1998). A theoretical analysis of the investor protection regulations argument for global listing of stocks. *Unpublished working paper, Yale School of Management*.

Gozzi, J. C., Levine, R., and Schmukler, S. L. (2008). Internationalization and the evolution of corporate valuation. *Journal of Financial Economics*, 88(3):607–632.

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

Hailling, M., Pagano, M., Randl, O., and Zechner, J. (2008). Where is the market? Evidence from cross-listings in the United States. *Review of Financial Studies*, 21(2):725–761.

Jayaraman, N., Shastri, K., and Tandon, K. (1993). The impact of international cross listings on risk and return. *Journal of Banking & Finance*, 17(1):91–103.

Kadlec, G. B. and McConnell, J. J. (1994). The effect of market segmentation and illiquidity on asset prices: Evidence from exchange listings. *Journal of Finance*, 49(2):611–636.

Kang, J.-K. and Stulz, R. M. (1997). Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan. *Journal of Financial Economics*, 46(1):3–28.

Karolyi, G. A. (1998). Why do companies list shares abroad?: A survey of the evidence and its managerial implications. *Financial Markets, Institutions & Instruments*, 7(1):1–60.

Karolyi, G. A. (2006). The world of cross-listings and cross-listings of the world: Challenging conventional wisdom. *Review of Finance*, 10(1):99–152.

King, M. R. and Segal, D. (2009). The long-term effects of cross-listing, investor recognition, and ownership structure on valuation. *Review of Financial Studies*, 22(6):2393–2421.

Lang, M. H., Lins, K. V., and Miller, D. P. (2003). ADRs, analysts, and accuracy: Does cross listing in the United States improve a firm's information environment and increase market value? *Journal of Accounting Research*, 41(2):317–345.

Lee, D. W. (2004). Why does shareholder wealth increase when non-U.S. firms announce their listing in the U.S.? *Working Paper, Ohio State University*.

Levine, R. and Schmukler, S. L. (2006). Internationalization and stock market liquidity. *Review of Finance*, 10(1):153–187.

Levine, R. and Schmukler, S. L. (2007). Migration, spillovers, and trade diversion: The impact of internationalization on domestic stock market activity. *Journal of Banking & Finance*, 31(6):1595–1612.

Lins, K. V., Strickland, D., and Zenner, M. (2005). Do non-U.S. firms issue equity on U.S. stock exchanges to relax capital constraints? *Journal of Financial & Quantitative Analysis*, 40(1):109–133.

Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information. *Journal of Finance*, 42(3):483–510.

Miller, D. P. (1999). The market reaction to international cross-listings: evidence from depository receipts. *Journal of Financial Economics*, 51(1):103–123.

Mittoo, U. R. (1992). Managerial perceptions of the net benefits of foreign listing: Canadian evidence. *Journal of International Financial Management & Accounting*, 4(1):40–62.

Pagano, M., Roell, A., and Zechner, J. (2002). The geography of equity listing: Why do companies list abroad? *Journal of Finance*, 57(6):2651–2694.

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

Roosenboom, P. and van Dijk, M. A. (2009). The market reaction to cross-listings: Does the destination market matter? *Journal of Banking & Finance*, 33(10):1898–1908.

Sarkissian, S. and Schill, M. J. (2004). The overseas listing decision: New evidence of proximity preference. *Review of Financial Studies*, 17(3):769–809.

Sarkissian, S. and Schill, M. J. (2009). Are there permanent valuation gains to overseas listing? *Review of Financial Studies*, 22(1):372–412.

Saudagaran, S. M. (1988). An empirical study of selected factors influencing the decision to list on foreign stock exchanges. *Journal of International Business Studies*, 19(1):101–127.

Smith, K. and Sofianos, G. (1997). The impact of an NYSE listing on the global trading of non-U.S. stocks. *NYSE Working Paper*, (97-02).

Solnik, B. H. (1974). Why not diversify internationally rather than domestically? *Financial Analysts Journal*, 30(4):48–54.

Stapleton, R. C. and Subrahmanyam, M. G. (1977). Market imperfections, capital market equilibrium and corporation finance. *Journal of Finance*, 32(2):307–319.

Stulz, R. M. (1981). A model of international asset pricing. *Journal of Financial Economics*, 9(4):383–406.

Stulz, R. M. (1999). Globalization, corporate finance, and the cost of capital. *Journal of Applied Corporate Finance*, 12:1–12.

Werner, I. and Kleidon, A. (1996). U.K. and U.S. trading of British cross-listed stocks: an intraday analysis of market integration. *Review of Financial Studies*, 9(2):619–664.

## **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 $CL\text{-}intensity_i$, 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, analyst following for 24 months around cross-listing date and control variables for liquidity, size and corporate governance background (see data description section).

| | **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 | 25 | 22 | 3 | 11 | 11 | |
| AUSTRALIA | 64 | 49 | 15 | 32 | 27 | 5 |
| BELGIUM | 7 | 5 | 2 | 5 | 3 | 2 |
| BRAZIL | 47 | 46 | 1 | 26 | 26 | |
| CANADA | 196 | 172 | 24 | 105 | 96 | 9 |
| CHILE | 27 | 27 | | 17 | 17 | |
| CHINA | 110 | 106 | 4 | 2 | 2 | |
| COLOMBIA | 3 | 3 | | 2 | 2 | |
| CZECH REPUBLIC | 6 | 1 | 5 | 4 | | 4 |
| DENMARK | 7 | 5 | 2 | 3 | 3 | |
| FINLAND | 13 | 8 | 5 | 5 | 5 | |
| FRANCE | 52 | 41 | 11 | 21 | 18 | 3 |
| GERMANY | 49 | 38 | 11 | 15 | 14 | 1 |
| GREECE | 26 | 16 | 10 | 8 | 3 | 5 |
| HONG KONG | 22 | 20 | 2 | 5 | 4 | 1 |
| HUNGARY | 10 | 2 | 8 | 3 | | 3 |
| INDIA | 168 | 17 | 151 | 80 | 13 | 67 |
| IRELAND | 96 | 32 | 64 | 1 | | 1 |
| ISRAEL | 121 | 110 | 11 | 8 | 6 | 2 |
| ITALY | 21 | 21 | | 6 | 6 | |
| JAPAN | 76 | 40 | 36 | 18 | 10 | 8 |
| KOREA | 41 | 18 | 23 | 26 | 7 | 19 |
| LUXEMBOURG | 13 | 6 | 7 | 1 | | 1 |
| MEXICO | 49 | 49 | | 16 | 16 | |
| NETHERLANDS | 49 | 37 | 12 | 11 | 8 | 3 |
| NEW ZEALAND | 10 | 10 | | 2 | 2 | |
| NORWAY | 23 | 17 | 6 | 9 | 6 | 3 |
| PAKISTAN | 2 | | 2 | 1 | | 1 |
| PERU | 4 | 4 | | 2 | 2 | |
| POLAND | 18 | 2 | 16 | 5 | | 5 |
| PORTUGAL | 5 | 4 | 1 | 2 | 1 | 1 |
| RUSSIA | 48 | 7 | 41 | 8 | 1 | 7 |
| SOUTH AFRICA | 63 | 26 | 37 | 9 | 4 | 5 |
| SPAIN | 16 | 11 | 5 | 1 | 1 | |
| SRI LANKA | 2 | | 2 | 1 | | 1 |
| SWEDEN | 38 | 24 | 14 | 10 | 7 | 3 |
| SWITZERLAND | 21 | 16 | 5 | 10 | 8 | 2 |
| TAIWAN | 66 | 9 | 57 | 54 | 6 | 48 |
| TURKEY | 13 | 1 | 12 | 7 | | 7 |
| U.K. | 197 | 197 | | 92 | 92 | |
| VENEZUELA | 3 | 3 | | 1 | 1 | |
| All countries: | 1,827 | 1,222 | 605 | 645 | 428 | 217 |

**Table 2:** Time series frequency distribution of sample

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 $CL\text{-}intensity_i$, 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, analyst following for 24 months around cross-listing date and control variables for liquidity, size and corporate governance background (see data description).

**Panel A: *Identified* Cross-Listings**

| | pre-1964 | 1964-79 | 1980-89 | 1990-99 | 2000-12 | Total all periods |
|---|---|---|---|---|---|---|
| All Firms | 65 | 95 | 206 | 786 | 675 | 1,827 |
| Developed Markets | 38 | 73 | 183 | 430 | 251 | 975 |
| Emerging Markets | 27 | 22 | 23 | 356 | 424 | 852 |
| US hosts | 22 | 58 | 142 | 578 | 422 | 1,222 |
| Non-US hosts | 43 | 37 | 64 | 208 | 253 | 605 |

**Panel B: *Studied* Cross-Listings**

| | pre-1964 | 1964-79 | 1980-89 | 1990-99 | 2000-12 | Total all periods |
|---|---|---|---|---|---|---|
| All Firms | | | 33 | 312 | 300 | 645 |
| Developed Markets | | | 33 | 176 | 145 | 354 |
| Emerging Markets | | | | 136 | 155 | 291 |
| US hosts | | | 27 | 221 | 180 | 428 |
| Non-US hosts | | | 6 | 91 | 120 | 217 |

**Table 3:** Summary of weekly excess returns and abnormal performance around cross-listing dates

Panel A reports statistics for the weekly (Wednesday close) total excess 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. "(-)" 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 a two-factor risk market model as explained in Section 2.3. 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. "(-)" 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 | | 2000-2011 | |
|---|---|---|---|---|---|---|---|---|
| | Mean (%) | pval | Mean (%) | pval | Mean (%) | pval | Mean (%) | pval |
| **Before Cross-Listings (weeks -52 to -1)** | | | | | | | | |
| All firms | 0.792 | 0.000 | 0.497 | 0.000 | 0.704 | 0.000 | 0.915 | 0.000 |
| Developed Markets | 0.709 | 0.000 | 0.497 | 0.000 | 0.668 | 0.000 | 0.806 | 0.000 |
| Emerging Markets | 0.893 | 0.000 | (-) | (-) | 0.750 | 0.000 | 1.018 | 0.000 |
| US hosts | 0.723 | 0.000 | 0.436 | 0.001 | 0.770 | 0.000 | 0.707 | 0.000 |
| Non US-hosts | 0.928 | 0.000 | 0.769 | 0.070 | 0.542 | 0.000 | 1.228 | 0.000 |
| *Differences in means (pval)* | | t-test | | t-test | | t-test | | t-test |
| DMs vs. EMs | | 0.069 | | (-) | | 0.536 | | 0.201 |
| US hosts vs. non-US hosts | | 0.057 | | 0.383 | | 0.081 | | 0.002 |

Panel B: abnormal performance around cross-listing

| | Full Sample | | 1980-1989 | | 1990-1999 | | 2000-2011 | |
|---|---|---|---|---|---|---|---|---|
| | Mean (%) | pval | Mean (%) | pval | Mean (%) | pval | Mean (%) | pval |
| **Before Cross-Listings (weeks -52 to -1)** | | | | | | | | |
| All firms | 0.544 | 0.000 | 0.164 | 0.073 | 0.466 | 0.000 | 0.666 | 0.000 |
| Developed Markets | 0.550 | 0.000 | 0.164 | 0.073 | 0.471 | 0.000 | 0.734 | 0.000 |
| Emerging Markets | 0.537 | 0.000 | (-) | (-) | 0.461 | 0.000 | 0.603 | 0.000 |
| US hosts | 0.542 | 0.000 | 0.083 | 0.378 | 0.532 | 0.000 | 0.622 | 0.000 |
| Non US-hosts | 0.548 | 0.000 | 0.529 | 0.052 | 0.307 | 0.000 | 0.733 | 0.000 |
| *Differences in means (pval)* | | t-test | | t-test | | t-test | | t-test |
| DMs vs. EMs | | 0.887 | | (-) | | 0.940 | | 0.360 |
| US hosts vs. non-US hosts | | 0.942 | | 0.090 | | 0.044 | | 0.460 |

## **Table 4:** Diversification portfolios

This table details information on diversification portfolios. 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 1 - ICB classification). The Augmented Diversification portfolios 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 | | | |
|---|---|---|---|---|---|---|---|---|
| | No. global industries | Correlations | t-test for equality Two-sided | One-sided | No. preceding CLs | Correlations | t-test for equality Two-sided | One-sided |
| All firms | 2.39 | 0.50 | | | 4.55 | 0.63 | | |
| Developed Markets | 2.55 | 0.53 | (0.00) | (0.00) | 4.82 | 0.63 | (0.99) | (0.51) |
| Emerging Markets | 2.21 | 0.46 | | | 4.21 | 0.63 | | |
| US hosts | 2.45 | 0.51 | (0.01) | (0.00) | 4.80 | 0.63 | (0.90) | (0.45) |
| Non-US hosts | 2.28 | 0.47 | | | 4.04 | 0.63 | | |

**Panel B**

| | | | | | | Average correlations | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Home Country* | Date first studied CL | Date first CL in augm. div. port. | No. country funds in augm. div. port. | Date of first country fund | No. firms with pos./neg. correlations | Full sample | 1980-1989 | 1990-1999 | 2000-2011 |
| ARGENTINA | Nov-93 | May-93 | 0.82 | Oct-91 | 11/0 | 0.71 | | 0.72 | 0.71 |
| AUSTRALIA | Aug-87 | Nov-52 | 2.25 | Nov-81 | 32/0 | 0.64 | 0.81 | 0.58 | 0.61 |
| BELGIUM | Sep-91 | Sep-91 | - | - | 5/0 | 0.65 | | 0.68 | 0.61 |
| BRAZIL | May-97 | May-92 | 1.58 | Mar-88 | 26/0 | 0.70 | | 0.69 | 0.70 |
| CANADA | Nov-80 | Dec-25 | 0.96 | Apr-86 | 105/0 | 0.58 | 0.65 | 0.52 | 0.62 |
| CHILE | Jul-90 | Jul-90 | 2.00 | Sep-89 | 17/0 | 0.62 | | 0.60 | 0.71 |
| CHINA | Dec-03 | Oct-92 | 2.00 | Jul-92 | 2/0 | 0.53 | | | 0.53 |
| COLOMBIA | Nov-94 | Nov-94 | - | - | 2/0 | 0.30 | | 0.30 | |
| CZECH REPUBLIC | Jul-95 | Oct-94 | 0.25 | Jan-96 | 4/0 | 0.54 | | 0.54 | |
| DENMARK | Apr-94 | Oct-78 | - | - | 3/0 | 0.45 | | 0.39 | 0.56 |
| FINLAND | Jul-94 | Aug-83 | - | - | 5/0 | 0.61 | | 0.60 | 0.61 |
| FRANCE | Jun-91 | Jun-84 | - | May-86 | 21/0 | 0.65 | | 0.62 | 0.68 |
| GERMANY | Dec-90 | Jul-60 | 1.00 | Jan-90 | 15/0 | 0.72 | | 0.79 | 0.71 |
| GREECE | Jun-97 | Feb-89 | - | Dec-92 | 8/0 | 0.53 | | 0.46 | 0.73 |
| HONG KONG | Dec-88 | Mar-88 | 0.80 | Nov-91 | 5/0 | 0.55 | 0.52 | 0.76 | 0.48 |
| HUNGARY | Nov-95 | Dec-92 | - | - | 3/0 | 0.54 | | 0.54 | |
| INDIA | Nov-94 | Apr-79 | 3.00 | Aug-88 | 80/0 | 0.61 | | 0.50 | 0.64 |
| IRELAND | Jul-00 | Jun-67 | 1.00 | Mar-90 | 1/0 | 0.48 | | | 0.48 |
| ISRAEL | Nov-95 | Jul-62 | 1.12 | Oct-92 | 8/0 | 0.61 | | 0.60 | 0.67 |
| ITALY | Jun-89 | Dec-72 | 1.00 | Feb-86 | 6/0 | 0.57 | 0.68 | 0.55 | |
| JAPAN | Oct-91 | Jun-64 | 1.94 | Mar-90 | 18/0 | 0.76 | | 0.80 | 0.73 |
| KOREA | May-91 | May-91 | 2.96 | Aug-84 | 26/0 | 0.64 | | 0.62 | 0.68 |

*(Continued on next page)*

*(Table 4 continued)*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LUXEMBOURG | Jul-00 | May-82 | - | - | 1/0 | 0.59 | | | 0.59 |
| MEXICO | Jun-92 | Mar-64 | 3.00 | Jun-81 | 16/0 | 0.68 | | 0.68 | |
| NETHERLANDS | May-89 | Oct-46 | - | - | 11/0 | 0.70 | 0.74 | 0.74 | 0.49 |
| NEW ZEALAND | Dec-93 | Jan-81 | 1.00 | Oct-88 | 2/0 | 0.60 | | 0.48 | 0.73 |
| NORWAY | Jun-88 | Apr-72 | - | - | 9/0 | 0.69 | 0.73 | 0.64 | 0.91 |
| PAKISTAN | Dec-06 | - | - | Jun-91 | 1/0 | 0.22 | | | 0.22 |
| PERU | May-96 | Sep-94 | - | - | 2/0 | 0.55 | | 0.55 | |
| POLAND | Aug-97 | Jul-97 | - | - | 5/0 | 0.60 | | 0.56 | 0.62 |
| PORTUGAL | Oct-96 | Jun-92 | - | - | 2/0 | 0.70 | | 0.70 | |
| RUSSIA | Nov-06 | Oct-96 | 2.88 | Feb-90 | 8/0 | 0.70 | | | 0.70 |
| SOUTH AFRICA | Feb-90 | Sep-36 | 0.67 | Feb-94 | 9/0 | 0.64 | | 0.62 | 0.70 |
| SPAIN | Oct-97 | Jul-83 | 1.00 | Feb-90 | 1/0 | 0.73 | | 0.73 | |
| SRI LANKA | Mar-94 | - | - | - | 0/1 | -0.10 | | -0.10 | |
| SWEDEN | Jun-87 | Sep-50 | - | - | 10/0 | 0.72 | 0.88 | 0.68 | 0.76 |
| SWITZERLAND | Jan-95 | Jun-89 | 1.70 | Aug-87 | 10/0 | 0.73 | | 0.63 | 0.77 |
| TAIWAN | Mar-93 | Apr-95 | 2.43 | Dec-86 | 54/0 | 0.67 | | 0.62 | 0.70 |
| TURKEY | Mar-94 | Feb-96 | 1.00 | Dec-89 | 7/0 | 0.61 | | 0.55 | 0.77 |
| U.K. | Jul-87 | Mar-57 | 0.73 | Aug-87 | 92/0 | 0.63 | 0.68 | 0.60 | 0.66 |
| VENEZUELA | Mar-93 | - | - | - | 1/0 | 0.44 | | 0.44 | |

## **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 information 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. ***, ** and * denote significance at the 1, 5 and 10 percent level, respectively.
Panel B reports information for each decade of the cross-listing. Vertically, we present a paired two-sample *t-test* for equal mean and a nonparametric *Wilcoxon test* for equal median analyst coverage across groups (EMs *vs.* DMs and US hosts *vs.* non-US hosts). Horizontally, the last column of each decade reports tests of higher analyst coverage in the post-CL period relatively to the pre-CL period. ***, ** and * denote significance at the 1, 5 and 10 percent level, respectively. "(-)" is reported when a test cannot be performed due to insufficient degrees of freedom in the subsample.

**Panel A - All subperiods**

| | | Pre cross-listing | | | Post cross-listing | | | |
|---|---|---|---|---|---|---|---|---|
| | | Analyst Coverage | Test for equality Two-sided | One-sided | Analyst Coverage | Test for equality Two-sided | One-sided | Difference Post-Pre |
| All firms | Mean | 14.81 | | | 17.56 | | | *** |
| | Median | 12.00 | | | 16.00 | | | *** |
| Developed Markets | Mean | 17.60 | (0.000) | (0.000) | 20.02 | (0.000) | (0.000) | ** |
| Emerging Markets | Mean | 11.27 | | | 14.42 | | | *** |
| Developed Markets | Median | 15.00 | (0.000) | (0.000) | 18.00 | (0.000) | (0.000) | *** |
| Emerging Markets | Median | 9.00 | | | 13.50 | | | *** |
| US hosts | Mean | 16.37 | (0.000) | (0.000) | 19.33 | (0.000) | (0.000) | *** |
| Non-US hosts | Mean | 11.44 | | | 13.72 | | | ** |
| US hosts | Median | 14.00 | (0.000) | (0.000) | 18.00 | (0.000) | (0.000) | *** |
| Non-US hosts | Median | 9.00 | | | 12.00 | | | *** |

**Panel B - Detail by subperiod**

| | | 1980-1989 | | | 1990-1999 | | | 2000-2011 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Pre-CL | Post-CL | Diff. Post-Pre | Pre-CL | Post-CL | Diff. Post-Pre | Pre-CL | Post-CL | Diff. Post-Pre |
| All firms | Mean | 16.71 | 20.71 | *** | 15.73 | 18.56 | *** | 13.59 | 16.09 | *** |
| | Median | 16.00 | 20.00 | *** | 13.00 | 17.00 | *** | 11.00 | 15.00 | *** |
| Developed Markets | Mean | 16.71 | 20.71 | *** | 18.77 | 21.01 | *** | 16.37 | 18.66 | *** |
| Emerging Markets | Mean | | | | 11.80 | 15.40 | *** | 10.75 | 13.47 | *** |
| *Equality test* | | (-) | (-) | | (0.000) | (0.000) | | (0.000) | (0.000) | |
| Developed Markets | Median | 16.00 | 20.00 | *** | 17.00 | 18.00 | *** | 13.00 | 17.00 | *** |
| Emerging Markets | Median | | | | 9.00 | 14.00 | *** | 9.00 | 13.00 | *** |
| *Equality test* | | (-) | (-) | | (0.000) | (0.001) | | (0.000) | (0.001) | |
| US hosts | Mean | 17.24 | 20.84 | *** | 16.83 | 19.99 | *** | 15.68 | 18.29 | *** |
| Non-US hosts | Mean | 14.50 | 20.17 | ** | 13.02 | 15.04 | *** | 9.84 | 12.16 | *** |
| *Equality test* | | (0.338) | (0.454) | | (0.007) | (0.001) | | (0.000) | (0.000) | |
| US hosts | Median | 17.00 | 20.00 | *** | 15.00 | 18.00 | *** | 12.50 | 17.00 | *** |
| Non-US hosts | Median | 9.50 | 19.00 | ** | 9.50 | 12.00 | *** | 9.00 | 11.00 | *** |
| *Equality test* | | (0.234) | (0.299) | | (0.012) | (0.000) | | (0.000) | (0.000) | |

**Table 6:** Role of financial segmentation and investor recognition in the price effect around cross-listing

This table reports estimated coefficients for a set of eight 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, firm size, home country corporate governance, geographic distance, and indicators of home country telecommunication infrastructure:

$$\alpha_{PRE,i} = \phi_1 + \phi_2\ CORR_{DIV,i} + \phi_3\ \Delta\lambda_i + \sum_{k=4}^{8} \phi_k\ \text{Control}_J + \phi_9\ \text{CL-intensity}_i + \phi_{10}\ \text{CL-intensity}_i \times CORR_{DIV,i} + \phi_{11}\ \text{CL-intensity}_i \times \Delta\lambda_i + \upsilon_i$$

The dependent variable ($\alpha_{PRE,i}$) represents the abnormal returns during the 52 weeks prior to the week of cross-listing computed from a two-factor risk market model as explained in Section 2.3. $CORR_{DIV,i}$ 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 a risk market model that estimates abnormal returns as presented in Section 2.3, 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)). $\upsilon_i$ 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. $DIST_i$ corresponds to the great circle distance between the capital cities of home and host countries, expressed in 1,000 km. $WDI_i$ is the average of the (i) mobile phone subscriptions rate, (ii) fixed-line telephone subscription rate and (iii) internet use rate for firm $i$'s home country, expressed in percent of the population (source: *World Development Indicators, World Bank*). 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*, *CRSP*, *LSE* and *LuxSE* factbooks). Developed and emerging market classification is based on MSCI Barra classification, supplemented by IMF classification if necessary.

**Panel A - Segmentation and investors' recognition - Separate analysis**

| Dep. var. $\alpha_{pre,i}$ | (1) | (1a) | (2) | (2a) |
|---|---|---|---|---|
| Constant | 0.0144 *** | 0.0035 | 0.0049 *** | 0.0024 *** |
| $CORR_{DIV,i}$ | -0.0142 *** | -0.0012 | | |
| $\Delta\lambda_i$ | | | -0.4328 *** | -0.2249 *** |
| CL-intensity$_i$ | | 0.0002 *** | | 0.0001 *** |
| CL-intensity$_i$ × $CORR_{DIV,i}$ | | -0.0003 *** | | |
| CL-intensity$_i$ × $\Delta\lambda_i$ | | | | -0.0054 *** |

| | *Interaction* | | *Interaction* |
|---|---|---|---|
| | *Value (quantile)* | $CORR_{DIV,i}$ | *Value (quantile)* | $\Delta\lambda_i$ |
| | 16 (25%) | -0.0055 | 16 (25%) | -0.3120 *** |
| | 36 (50%) | -0.0110 *** | 36 (50%) | -0.4208 *** |
| | 46.2 (Avg) | -0.0138 *** | 46.2 (Avg) | -0.4764 *** |
| | 75 (75%) | -0.0217 *** | 75 (75%) | -0.6331 *** |
| | 139 (1) | -0.0392 *** | 139 (1) | -0.9814 *** |

| | | | | |
|---|---|---|---|---|
| No. observations: | 645 | 645 | 645 | 645 |
| *No. Developed Maket firms* | *354* | *354* | *354* | *354* |
| *No. Emerging Maket firms* | *291* | *291* | *291* | *291* |
| Adj. $R^2$ | 3.24% | 8.19% | 8.10% | 12.82% |

*(continued on next page)*

*(Table 6 continued)*

**Panel B - Segmentation and investors' recognition - Controls and multivariate analysis**

Dependent variable $\alpha_{pre,i}$

| | (3) | (4) | (5) | (6) |
|---|---|---|---|---|
| Constant | 0.0131 *** | 0.0106 *** | 0.0123 *** | 0.0056 |
| $CORR_{DIV,i}$ | -0.0079 ** | | -0.0048 | 0.0064 |
| $\Delta\lambda_i$ | | -0.4528 *** | -0.4426 *** | -0.2621 *** |
| $LIQ_i$ | 0.0091 ** | 0.0130 *** | 0.0129 *** | 0.0122 *** |
| $GOV_i$ | 0.0011 ** | 0.0010 ** | 0.0010 ** | -0.0002 |
| $SIZE_i$ | -0.0012 *** | -0.0015 *** | -0.0013 *** | -0.0011 *** |
| $DIST_i$ | -0.0001 | -0.0001 | -0.0001 | 0.0001 |
| $WDI_i$ | 0.0063 ** | 0.0051 ** | 0.0054 *** | 0.0022 |
| CL-intensity$_i$ | | | | 0.0002 *** |
| CL-intensity$_i$ × $CORR_{DIV,i}$ | | | | -0.0003 *** |
| CL-intensity$_i$ × $\Delta\lambda_i$ | | | | -0.0052 *** |

Interactions with CL-intensity$_i$

| *Value (quantile)* | *Interaction* $CORR_{DIV,i}$ | *Interaction* $\Delta\lambda_i$ |
|---|---|---|
| 16 (25%) | 0.0018 | -0.3454 *** |
| 36 (50%) | -0.0038 | -0.4497 *** |
| 46.2 (Avg) | -0.0067 ** | -0.5028 *** |
| 75 (75%) | -0.0148 *** | -0.6529 *** |
| 139 (1) | -0.0329 *** | -0.9864 *** |

| | | | | |
|---|---|---|---|---|
| No. observations: | 645 | 645 | 645 | 645 |
| *No. Developed Maket firms* | *354* | *354* | *354* | *354* |
| *No. Emerging Maket firms* | *291* | *291* | *291* | *291* |
| Adj. $R^2$ | 7.58% | 15.70% | 15.87% | 20.60% |

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

**Table 7:** Role of financial segmentation and investor recognition in the price effect around cross-listing - Information Frictions

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 segmentation, investor awareness, number of cross-listings from the same country active at the time of cross-listing, and controls for trading volume, firm size, home country corporate governance, geographic distance, and indicators of home country telecommunication infrastructure:

$$\alpha_{PRE,i} = \phi_1 + \phi_2\ CORR_{DIV,i} + \phi_3\ \Delta\lambda_i + \sum_{k=4}^{8} \phi_k\ \text{Control}_J + \phi_9\ \text{CL-intensity}_i + \phi_{10}\ \text{CL-intensity}_i \times CORR_{DIV,i} + \phi_{11}\ \text{CL-intensity}_i \times \Delta\lambda_i + \upsilon_i$$

The dependent variable ($\alpha_{PRE,i}$) represents the abnormal returns during the 52 weeks prior to the week of cross-listing computed from a two-factor risk market model, as explained in Section 2.3. $CORR_{DIV,i}$ 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 a risk market model that estimates abnormal returns as presented in Section 2.3, 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)). $\upsilon_i$ 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. $DIST_i$ corresponds to the great circle distance between the capital cities of home and host countries, expressed in 1,000 km. $WDI_i$ is the average of the (i) mobile phone subscriptions rate, (ii) fixed-line telephone subscription rate and (iii) internet use rate for firm $i$'s home country, expressed in percent of the population (source: *World Development Indicators, World Bank*). 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*, *CRSP*, *LSE* and *LuxSE* factbooks). Developed and emerging market classification is based on MSCI Barra classification, supplemented by IMF classification if necessary.

**Panel A - By Market Value of Cross-Listings**

| Dependent variable $\alpha_{pre,i}$ | Market Value in all hosts is below Median | | | Market Value in all hosts is above Median | | |
|---|---|---|---|---|---|---|
| | (3) | (4) | (6) | (3) | (4) | (6) |
| Constant | 0.0060 | -0.0020 | -0.0002 | 0.0042 | 0.0001 | 0.0018 |
| $CORR_{DIV,i}$ | -0.0132** | | 0.0031 | -0.0062* | | -0.0010 |
| $\Delta\lambda_i$ | | -1.7370*** | -1.6235*** | | -0.4041*** | -0.1818*** |
| $LIQ_i$ | 0.0089 | 0.0098* | 0.0095* | 0.0058 | 0.0276*** | 0.0186** |
| $GOV_i$ | 0.0022** | 0.0020** | -0.0005 | 0.0002 | 0.0001 | -0.0002 |
| $DIST_i$ | -0.0002 | -0.0003* | 0.0001 | 0.0001 | 0.0000 | 0.0001 |
| $WDI_i$ | 0.0057 | 0.0071** | 0.0014 | 0.0052** | 0.0030 | 0.0029 |
| CL-intensity$_i$ | | | 0.0003*** | | | 0.0000 |
| CL-intensity$_i$ × $CORR_{DIV,i}$ | | | -0.0004*** | | | 0.0000 |
| CL-intensity$_i$ × $\Delta\lambda_i$ | | | -0.0008 | | | -0.0055*** |

| Interactions with CL-intensity$_i$ | | | Interactions with CL-intensity$_i$ | | |
|---|---|---|---|---|---|
| | *Interaction* | *Interaction* | | *Interaction* | *Interaction* |
| *Value (quantile)* | $CORR_{DIV,i}$ | $\Delta\lambda_i$ | *Value (quantile)* | $CORR_{DIV,i}$ | $\Delta\lambda_i$ |
| 19 (25%) | -0.0041 | -1.6379*** | 14 (25%) | -0.0017 | -0.2592*** |
| 44 (50%) | -0.0136*** | -1.6569*** | 33 (50%) | -0.0026 | -0.3642*** |
| 49.83 (Avg) | -0.0159*** | -1.6614*** | 42.63 (Avg) | -0.0030 | -0.4174*** |
| 80.75 (75%) | -0.0276*** | -1.6848*** | 58 (75%) | -0.0037 | -0.5023*** |
| 139 (1) | -0.0498*** | -1.7291** | 139 (1) | -0.0075 | -0.9499*** |

| | | | | | | |
|---|---|---|---|---|---|---|
| No. observations: | 322 | 322 | 322 | 322 | 322 | 322 |
| *No. Developed Market firms* | 162 | 162 | 162 | 192 | 192 | 192 |
| *No. Emerging Market firms* | 160 | 160 | 160 | 130 | 130 | 130 |
| Adj. $R^2$ | 3.62% | 13.18% | 20.01% | 0.75% | 23.94% | 29.83% |

*(continued on next page)*

*(Table 7 continued)*

**Panel B - Emerging Market firms**

| Dependent variable $\alpha_{pre,i}$ | EMs in all hosts | | | EMs in non-US hosts | | |
|---|---|---|---|---|---|---|
| | (3) | (4) | (6) | (3) | (4) | (6) |
| Constant | 0.0141*** | 0.0092** | 0.0022 | 0.0134** | 0.0086 | 0.0056 |
| $CORR_{DIV,i}$ | -0.0113** | | 0.0029 | -0.0191*** | | -0.0100 |
| $\Delta\lambda_i$ | | -0.2956*** | -0.1809 | | -0.3364 | -0.3135 |
| $LIQ_i$ | 0.0084* | 0.0115** | 0.0099** | 0.0266** | 0.0265** | 0.0228* |
| $GOV_i$ | 0.0006 | 0.0005 | -0.0004 | 0.0016* | 0.0008 | -0.0009 |
| $SIZE_i$ | -0.0010** | -0.0012*** | -0.0002 | -0.0012** | -0.0016*** | 0.0000 |
| $DIST_i$ | 0.0003 | 0.0003 | 0.0002 | 0.0003 | 0.0002 | 0.0003 |
| $WDI_i$ | 0.0017 | -0.0003 | -0.0011 | 0.0110** | 0.0047 | 0.0059 |
| CL-intensity$_i$ | | | 0.0004*** | | | 0.0004*** |
| CL-intensity$_i \times CORR_{DIV,i}$ | | | -0.0005*** | | | -0.0005*** |
| CL-intensity$_i \times \Delta\lambda_i$ | | | -0.0054 | | | 0.0003 |

| Interactions with CL-intensity$_i$ | | | Interactions with CL-intensity$_i$ | | |
|---|---|---|---|---|---|
| | *Interaction* | *Interaction* | | *Interaction* | *Interaction* |
| *Value (quantile)* | $CORR_{DIV,i}$ | $\Delta\lambda_i$ | *Value (quantile)* | $CORR_{DIV,i}$ | $\Delta\lambda_i$ |
| 12 (25%) | -0.0033 | -0.2459** | 13.25 (25%) | -0.0160** | -0.3100 |
| 29 (50%) | -0.0121** | -0.3379*** | 36.5 (50%) | -0.0266*** | -0.3040 |
| 36.38 (Avg) | -0.0159*** | -0.3779*** | 43.68 (Avg) | -0.0299*** | -0.3021 |
| 48 (75%) | -0.0219*** | -0.4408*** | 61.5 (75%) | -0.0380*** | -0.2974 |
| 139 (1) | -0.0688*** | -0.9334* | 139 (1) | -0.0732*** | -0.2773 |

| | | | | | | |
|---|---|---|---|---|---|---|
| No. observations: | 291 | 291 | 291 | 174 | 174 | 174 |
| *US listed* | 117 | 117 | 117 | 0 | 0 | 0 |
| *Non-US listed* | 174 | 174 | 174 | 174 | 174 | 174 |
| Adj. $R^2$ | 4.60% | 5.31% | 12.14% | 11.47% | 6.40% | 21.76% |

*(continued on next page)*

*(Table 7 continued)*

**Panel C - By Anti-Directors Rights ($GOV_i$) in US hosts**

| Dependent variable $\alpha_{pre,i}$ | $GOV_i$ is below Median($GOV$) in US hosts | | | $GOV_i$ is above Median($GOV$) in US hosts | | |
|---|---|---|---|---|---|---|
| | (3) | (4) | (6) | (3) | (4) | (6) |
| Constant | 0.0013 | 0.0032 | 0.0175*** | 0.0160*** | 0.0159*** | -0.0007 |
| $CORR_{DIV,i}$ | 0.0050 | | -0.0203** | -0.0063 | | 0.0143 |
| $\Delta\lambda_i$ | | -0.4683* | 0.5777 | | -0.5243*** | -0.1145 |
| $LIQ_i$ | 0.0080** | 0.0078** | 0.0089*** | 0.0051 | 0.0559*** | 0.0195 |
| $SIZE_i$ | -0.0001 | 0.0000 | -0.0002 | -0.0019*** | -0.0021*** | -0.0018*** |
| $DIST_i$ | 0.0001 | 0.0000 | 0.0002 | 0.0007* | 0.0002 | 0.0008** |
| $WDI_i$ | -0.0048 | -0.0038 | -0.0019 | 0.0103** | 0.0090** | 0.0056 |
| CL-intensity$_i$ | | | -0.0010*** | | | 0.0002 |
| CL-intensity$_i$ $\times$ $CORR_{DIV,i}$ | | | 0.0015*** | | | -0.0002 |
| CL-intensity$_i$ $\times$ $\Delta\lambda_i$ | | | -0.0686** | | | -0.0079*** |

| Interactions with CL-intensity$_i$ | | | Interactions with CL-intensity$_i$ | | |
|---|---|---|---|---|---|
| | *Interaction* | *Interaction* | | *Interaction* | *Interaction* |
| *Value (quantile)* | $CORR_{DIV,i}$ | $\Delta\lambda_i$ | *Value (quantile)* | $CORR_{DIV,i}$ | $\Delta\lambda_i$ |
| 8 (25%) | -0.0084 | 0.0291 | 33 (25%) | 0.0061 | -0.3765*** |
| 17 (50%) | 0.0049 | -0.5881** | 53 (50%) | 0.0011 | -0.5353*** |
| 18.23 (Avg) | 0.0067 | -0.6722** | 58.26 (Avg) | -0.0002 | -0.5770*** |
| 27 (75%) | 0.0196*** | -1.2738*** | 87 (75%) | -0.0074 | -0.8052*** |
| 76 (1) | 0.0921*** | -4.6339** | 113 (1) | -0.0138 | -1.0115*** |

| | | | | | | |
|---|---|---|---|---|---|---|
| No. observations: | 119 | 119 | 119 | 157 | 157 | 157 |
| *No. Developed Market firms* | 76 | 76 | 76 | 107 | 107 | 107 |
| *No. Emerging Market firms* | 43 | 43 | 43 | 50 | 50 | 50 |
| Adj. $R^2$ | 3.76% | 6.00% | 12.59% | 7.92% | 25.67% | 34.77% |

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