

Determinants of Liquidity (Re-)Allocation and the Decision to Cross-List

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Abstract

This paper examines the driving factors of liquidity allocation between local and foreign dual listings. We first identify and disentangle four theoretical sources of liquidity re-allocation: (1) the stage of economic development, (2) the regulatory environment, (3) the maturity of the capital market, and (4) the degree of market integration into the international capital market of a company's home country. Using data for the period 1992 to 2010, the empirical results suggest that the fraction of trading in the foreign listing decreases with a higher degree of stock market integration and a more mature local capital market. The analysis of individual cross listings reveals that an improvement of a country's economic development and regulatory environment directly lead to a reallocation of liquidity away from the foreign back to the local listing. The liquidity of the local listing is found to significantly increase over time, especially for stocks listed in less developed capital markets, while liquidity in the foreign listing decreases only slightly.

Keywords: Cross-listing; liquidity allocation; market integration; economic development

JEL-Classification: G12, G15

1 Introduction

To benefit from the promised blessings associated with tapping better integrated capital markets, many companies around the world started to cross list their shares in the form of depository receipts on well known international stock exchanges over the last decades. Reasons typically associated with cross-listings are higher liquidity, more investor recognition and a decrease in the cost of capital. In recent years, however, various corporations decided to terminate their dual listing again. The most often cited reasons for a delisting are typically related to the development of the depository receipt's liquidity. While some companies decided to terminate their foreign listing due to poor liquidity development, others feared that the foreign listing might become too successful which in turn could lead to a reallocation of liquidity away from the local market and consequently to a decrease in local visibility.

Given this anecdotic evidence, this paper analyses the liquidity development of still listed and already delisted depository receipts (DR) in order to identify the driving factors behind the success or failure of a DR program. At this, an increase in liquidity in the DR is seen as an indicator for a foreign listing's success as market participants make increased use of the secondary listing. If liquidity never picks up or dries out over time, it can be interpreted as a sign of disinterest. Related literature pointed to two major determinants of liquidity in cross listed DRs: capital market segmentation and liquidity concentration. Whereas market segmentation seems to always work in favor of the DR as international investors can more easily invest in that company via the foreign listing, the effect of liquidity concentration on its allocation is rather unclear. The concentration hypothesis states that, except for extreme differences in trading and transaction costs, liquidity always tends to concentrate on one exchange. Consequently, two questions arise: Does liquidity concentrate on the foreign or the local exchange? And what role does the development of the local market play in determining the direction of the liquidity concentration? We thereby explicitly distinguish between effects stemming from 1) the stage of economic development, 2) the regulatory environment 3) the

development of the local capital market, and 4) the degree of integration into the international capital market of a company's home country. We further investigate the observed changes in the liquidity ratio by simultaneously taking into account the liquidity reactions of each listing, local and foreign, separately.

The empirical results suggest that the fraction of trading in the foreign listing decreases with an increase in market integration and a better development of the local capital market. Looking at each listing separately, the economic development as well as a better regulatory environment of a country as measured by its investment protection schemes and the local government's policy towards foreign direct investment are found to lead to a direct reallocation of liquidity away from the foreign back to the local listing. Over time, the liquidity of the local exchange especially of less developed capital markets increases while the foreign liquidity remains fairly constant. The relative reallocation back to the local market is found to be the more pronounced, the less developed the local market and the higher the current share of foreign trade which contradicts the concentration hypothesis.

The findings of this paper have major implications for companies that evaluate whether to cross list their shares on another capital market as it identifies the driving factors behind the success or failure of cross-listings. Additionally, the findings are of interest for financial institutions such as ETF providers offering products based on depository receipts. As the empirical results show, liquidity tends to return to the home market when the local market integrates which gives such products only a transitional nature.

The remainder of the paper is structured as follows: In the next section, we present the underlying theories of why companies think about cross-listing their shares abroad. In section 3, we discuss the determinants of liquidity allocation and derive related hypotheses. Section 4 describes the data and our estimation strategy. The empirical results are summarized and interpreted in section 5. Section 6 concludes.

2 Why Decide Companies to List and Delist Depository Receipts?

2.1 Reasons to Cross List

Hitherto, many hypotheses explaining why companies cross-list their shares have been constructed and tested. The majority can be traced back to just a few underlying hypotheses: the market segmentation hypothesis, the information disclosure hypothesis, the investor protection hypothesis, and the market liquidity hypothesis.

Market segmentation hypothesis: With regard to the initial cross listing, empirical studies found positive abnormal returns around the announcement date.¹ These positive deviations have often been explained with the overcoming of market segmentation as major disadvantage of purely locally listed stocks without the ability to tap international capital markets. Previous literature shows that local equity markets often differ from a fully integrated international equity market. Jorion and Schwarz (1986) defined integration as a situation where investors earn the same risk-adjusted expected return on similar financial instruments in different national markets.²

Reasons for market segmentation are manifold. They might be due to investors' inhibitions or official restrictions. Investors' inhibitions could simply be caused by a lack of information regarding the target market, by fear of expropriation or also by discriminatory taxation for foreign investors. Official restrictions could be exchange and border controls restricting foreigners' access to local capital markets or reduce their freedom to repatriate

¹ For an analysis of price reactions to cross-listings, see: Stapleton and Subrahmanyam (1977), Errunza and Losq (1985), Alexander, Eun and Janakiramanan (1988), Torabzadeh, Bertin and Zivney (1992), Kadlec and McConnell (1994), Sie, Diltz and Apilado (1994), Sundaram and Logue (1996), Foerster and Karoly (1999), Miller (1999), Serra (1999), Doukas and Switzer (2000), Errunza and Miller (2000), Bris, Cantale and Nishiotis (2007), Litvak (2008), Roosenboom and van Dijk (2009), and Sarkissian and Schill (2009).

² In a similar vein according to Eiteman, Stonehill and Moffett. (2010: 367), "a national capital market is segmented if the required rate of return on securities in that market differs from the required rate of comparable expected return and risk traded on other securities markets".

capital and dividends. Some countries, predominantly emerging markets, also formally restrict the fraction of the local firm's equity that can maximally be owned by foreign investors.

Empirical findings show that for companies resident in not (yet) fully integrated markets, this has major implications with regard to a company's cost of equity and the liquidity of its shares issued. Serra (1999) found a positive revaluation effect around the announcement date of a cross-listing on a major international stock exchange. In the attempt to further explain these positive abnormal returns, he observed that positive returns are even more pronounced for emerging market firms assuming that these markets are more segmented than their developed counterparts.

According to the above given definition based on the law of one price, it can be derived that the choice of listing a corporation's shares outside of a segmented or semi-integrated market has direct consequences for the rate of return required by investors and in turn for the firm's cost of capital. In line with international capital market theory, Hietala (1980) hypothesized that investors which are restricted from diversifying internationally might require a higher rate of return on local stocks, as they are not able to diversify away the specific country risk. Solnik (1974) as well as Grauer and Hakansson (1987) applied this reasoning to the international setting and showed that investors should invest internationally in order to further lower their diversifiable, non-systematic risk.

Thus, companies might be able to significantly reduce their cost of capital when escaping local segmentation and tapping global capital markets. Global investors do not require a risk premium for the specific country risk as locally restricted investors do. These lower expected cost of capital are the reason why quite numerous empirical studies observed abnormal positive returns around the announcement date of a cross-listing.

Information disclosure hypothesis: The information disclosure hypothesis assumes that companies that cross-list in markets with higher disclosure requirements signal their quality to outside investors. Baker, Nofsinger and Weaver (2002) and Lang, Lins and Miller

(2003) showed that cross listings are in fact followed by greater media attention, greater analyst coverage, better analysts' forecast accuracy, and higher quality of accounting information.

Against this background, cross-listing shares in well-developed and integrated capital markets should be especially beneficial for companies resident in less developed markets such as emerging or frontier markets making it more interesting for local and foreign investors. To sum up, the signaling effect is hypothesized to have a favorable effect for the company by decreasing the return expected by investors that want to buy the corporation's shares and thus leads to a positive revaluation effect.

Investor protection hypothesis: The investor protection argument is the underlying reasoning for the bonding hypothesis. "By subjecting themselves to [stricter] laws and institutions, the controlling shareholders of foreign firms credibly bond themselves to avoid some types of actions that might decrease the wealth of minority shareholders (Doidge, Karolyi and Stultz (2009))." Especially for companies resident in countries with lower legal- and institutional standards, a commitment to the harsh disclosure requirements linked to a secondary listing on one of the major international stock exchanges, benefits from bonding should be evident.

Following this line of argumentation, companies cross-list on exchanges with higher standards in order to protect the interest of minority shareholders which again, makes it more attractive not only for foreign but also for local investors. Similar to the market segmentation hypothesis, it is assumed that better investor protection leads to a decrease in the cost of capital required by investors. Doidge, Karolyi and Stultz (2004) showed that companies cross-listed in the U.S. had a higher valuation than companies that do not cross-list.

Market liquidity hypothesis: The liquidity hypothesis assumes that a cross listing in more developed and more liquid equity markets increases the overall liquidity of both shares. Foreign investors that were formerly restricted from directly investing in a given capital

market can now get exposure to companies resident in unaccessible markets. Smith and Sofianos (1996) found that the aggregated trading volume of the foreign and the local listing significantly increased for corporations that cross-list on U.S. stock exchanges.

According to Kyle's (1985) auction model, liquidity is related to the information environment. It depends on the interaction between a risk-neutral market maker, informed traders and (uninformed) liquidity traders. Chowdhry and Nandra (1991) examine this model in a multi-market context and show that bid-ask spreads can be significantly lowered due to increased competition among different market-makers. Increased liquidity, in turn, helps to reduce the cost of capital and thus, increases the firm value.

This increase in liquidity should, in turn attract even more liquidity. Institutional investors are typically bound to minimum liquidity thresholds. These often define their maximum investment allowed in a given stock. Higher turnover, e.g. by a secondary listing, will make this stock available for a greater number of institutional investors. According to Witmer (2005), this can be interpreted in terms of the market segmentation hypothesis, where the institutions are the restricted investors, i.e. "improving the liquidity turns these institutions into unrestricted investors, [...]."

2.2 Reasons to Delist

Against the initial trend to cross-list, more and more companies, including large European names such as Ahold, Air France, Bayer, British Airways, Danone, and Fiat but also companies resident in emerging markets recently decided to delist from international stock exchanges such as the NYSE or the LSE. Against the background of the above given reasoning, the termination of a foreign listing should primarily be accompanied by negative side effects, e.g., a decrease in the aggregated trading volume or a rise in the company's cost of capital.³ Hence the question arises, what drives these companies to abandon the advantages

³ For an analysis of price reactions to delistings, see Witmer (2006), Hostak, Lys and Yang (2006), Marosi and Massoud (2008), Doidge, Karolyi and Stulz (2009), Fernandes, Lel and Miller (2010).

of a cross-listing? It is the balance between the benefits deriving from the above stated hypothesis and, as expressed by Doidge et al. (2009), the “loss of competitiveness”. A foreign listing is usually linked to higher costs and complexity. Since 2002, all companies listed on a U.S. exchange need to be compliant with the Sarbanes Oxley Act (SOX) which demands a strict and costly internal control system. These extra costs may result in a loss of competitiveness.

Against this background, the decision to terminate a secondary listing can be justified, whenever the net benefits of all factors are no longer positive. Looking at companies such as BASF, Air France and Danone that delisted from the NYSE in 2007, market segmentation does no longer seem to be an issue. Additionally, the standard of information disclosure of these companies is already very high, even without being compliant with requirements as imposed by the Sarbanes Oxley Act.

The empirical results of this paper show that the foreign liquidity fraction of companies locally listed in developed and integrated capital markets is significantly smaller compared to companies locally listed in less developed or segmented markets. In fact, a low share of trading has been among the most often cited reasons for a delisting.

3 Determinants of Liquidity Allocation

The question now arises why so many companies were wrong as they initially decided to bear those administrative costs and dually listed their shares in a foreign market if liquidity in the end turned out to work against their expectations. Or has the market environment in which corporations made their decision to cross list changed in the meantime? To answer those questions, it is of essential importance to better understand the driving factors behind the liquidity allocation between the local and the foreign listing. The following passage summarizes the factors that are assumed to influence liquidity allocation and develops the hypotheses.

Market Segmentation: To overcome market segmentation in order to lower a corporation's cost of capital, it is essential to attract foreign market participants. The attractiveness of a cross listing for international investors can in turn be assessed when looking at the depository receipt's liquidity. The more liquid a foreign listing, the more attractive the investment and the higher the benefit from overcoming market segmentation. Hargis (2000) developed a theoretical model forecasting that the price reaction associated with the initial cross listing depends on the liquidity conditions of the local market prior to cross-listing. His theory predicts that the less liquid the local market, the larger the benefits and thus, the higher the positive abnormal returns around the cross-listing. His theory is supported by the findings of Witmer (2005) who observed that a higher turnover percentage in DRs increases the negative cumulative abnormal returns when a company decides to terminate its foreign listing again. Knowing about the relation between the liquidity in the foreign listing and the resulting benefit for a company, especially when situated in a segmented market environment, it is of essential importance to understand how the liquidity of the foreign and local listing develop against the background of a change in the state of local capital market integration.

It is hypothesized that an increase in a local capital market's integration into the world capital market should lead to a re-concentration of liquidity on the local exchange. This assumption is supported by the information hypothesis stating that information density with regard to a given company is highest in its home market. If the access to the local market becomes easier, due to the absence of official or unofficial restrictions, liquidity should therefore re-shift to the local market.

Hypothesis H1.1: *The liquidity share in depository receipts is higher for companies locally listed in less integrated markets than for companies locally listed in integrated markets.*

Hypotheses 1 refers to the DR liquidity measured as a fraction of local liquidity. One might intuitively think that a decrease in this ratio is always caused by a decrease in foreign

and an increase in the local liquidity. But a decrease driven by an exogenous determinant can also occur if the local and the foreign liquidity increase simultaneously but the local liquidity increases at higher rates.

Since a decrease in market segmentation means that direct and indirect investment barriers cease to exist, foreign liquidity should always decrease to the benefit of the local liquidity.

Against this background, a second hypothesis is stated:

***Hypothesis H1.2:** The foreign [local] liquidity should be higher [smaller] for companies locally listed in less integrated markets than for companies listed in fully integrated markets.*

Development of the Local Capital Market: As mentioned by Halling, Pagano, Randell and Zechner (2008), it can be expected that the market with the lowest trading costs should c.p. attract the highest fraction of liquidity. Due to the difficulty to directly measure market specific trading costs, the market capitalization is used as proxy for trading costs in this analysis. Domowitz, Glen and Madhavan (2001) pointed out that trading costs are inversely related to the size (or capitalization) of the equity market.

***Hypothesis H2:** The liquidity share in the depository receipts is higher for companies locally listed in capital markets of lower development than for companies locally listed in capital markets of higher development.*

Economic and Regulatory Development of the Local Market: Related studies in this field of research typically refer to “developed” and “emerging” markets to explain differences in liquidity allocations. These classifications are usually not exclusively based on capital market related criteria but also take into account the general state of a country’s economy.

Considering that, it is important to also assess the economic and regulatory development of a country to disentangle the effects from all driving factors.

An increase in the economic stability as well as in a country’s regulatory frame should be beneficial for local corporations as their business environment improves. This should make

the company more attractive for investors (local and foreign alike) and consequently lead to an increase in both, the local and foreign liquidity.

Hypothesis H3.1: *An increase in a country's economic stability leads to an increase in both the local and foreign liquidity.*

Hypothesis H3.2: *An improvement in a country's regulatory standards leads to an increase in both the local and foreign liquidity.*

The question now arises whether those two aspects work more heavily in favor of the local or the foreign listing. As pointed out, economic stability should work in favor of the company and should therefore make it more attractive to local and foreign investors alike. Additionally, an increase in a country's economic stability goes hand in hand with an increase in the purchasing power of its inhabitants. An enhanced purchasing power should also have a positive influence on an economy's capital market resulting in a higher number of stocks being traded. Thus, the overall effect of an increased economic environment should work more heavily in favor of the local listing.

Hypothesis H4.1: *An increase in the economic stability of a country leads to a decrease in the liquidity share of the DR.*

A related reasoning can be applied with regard to the second aspect, the regulatory system. Even though an improved regulatory frame is hypothesized to work in favor of the company and therefore increase the liquidity in both listings, a second aspect needs to be considered. As discussed above, market segmentation can also be caused by indirect factors such as the fear of expropriation or a lack of information regarding a target market. An improvement in the regulatory environment, e.g. by the introduction of better investment protection schemes or a policy which is more beneficial towards foreign investment should lead to a decrease at least of the indirect kind of market segmentation which should redirect liquidity back to the local market where information density is highest. This leads to the seventh hypothesis:

***Hypothesis H4.2:** An improvement in the regulatory environment of a country decreases the fraction of trade at the foreign market.*

The Concentration Effect: According to Kyle's (1985) auction model, liquidity is related to the information environment. It depends on the interaction between a risk-neutral market maker, informed traders and (uninformed) liquidity traders. Chowdhry and Nandra (1991) examine this model in a multi-market context and show that bid-ask spreads can be significantly lowered due to increased competition among different market-makers.

Against this background, the co-existence of more than one listing is at least economically justified. This explanation is partially backed by empirical findings in the related literature. Mittoo (1997) examined the effect of dual-listings on the liquidity in the local market. For Canadian companies listed on the TSE, she found an increase in total trading volume after a cross-listing. Focusing on companies cross-listed in the United States, Smith and Sofianos (1996) as well as Bris, Cantale and Nishiotis (2007) found a significant increase in the liquidity of both share classes after cross-listing. Additionally, Foerster and Karolyi (1998) examined that Canadian companies dually listed in the U.S. were able to significantly decrease bid-ask spreads.

On the other hand, however, there is a variety of studies that predict an agglomeration of trading on just one exchange where the informational advantages of domestic traders are the highest.⁴ According to their reasoning, an emancipated trading between two exchanges can never prevail in the long run, unless significant differential trading frictions exist. This would argue for a concentration either in the foreign, or the domestic exchange.

Based on a global sample of companies from 45 emerging economies, Levine and Schmuckler (2006) found that the domestic liquidity of firms that cross-list tends to decrease while concentrating on the foreign exchange. For a small sample of Mexican companies that cross listed their shares abroad, Domowitz, Glen and Madhavan (1998) also found that local

⁴ See Halling et al (2007) for a literature overview.

liquidity decreased after cross listing. Their findings are further backed by theoretical models (see Admati and Pfleiderer (1988), Pagano (1989), Chowdry and Nanda (1991)).

Focusing on the location of local trading of stocks dually-listed in the U.S., Halling, et al. (2008) identified a variety of variables influencing the distribution of trading volume. According to their results, the turnover of DR trading as fraction of local trading volume is larger for companies located geographically close to the exchange where the DR is traded. Additionally, they found that the share of trading that takes place in the DR is larger for companies based in emerging economies compared to companies originated in developed countries. Another interesting result is that over time, this relative share of foreign trade increased for emerging market companies and decreased for companies from developed markets. With regard to company characteristics, they observed a higher turnover percentage in DRs for smaller, highly volatile and technically oriented companies.

Hypotheses H1.1, H2, H4.1 and H4.2 state that the foreign liquidity fraction is higher for companies resident in more segmentation markets (H1.1), less developed capital markets (H2), and less stable economies (H4.1) that display a poor regulatory environment (H4.2). These statements can be supported if the liquidity fraction in the local listing is found to be relatively higher for companies locally listed in developed markets and lower for companies locally listed in less developed markets. From the perspective of the local listing, the concentration effect, if existing, should then work relatively more heavily (less heavily) in the direction of the local market (foreign market) for developed market companies than for emerging market companies.

To isolate the concentration effect from the other hypothesized effects, the development of the foreign liquidity fraction is observed over time by keeping the degree of capital market segmentation [capital market development; economic stability, regulatory state] constant and simultaneously controlling for the other factors in the empirical model. This leads us to our last hypothesis.

Hypothesis H5: *For companies locally listed in integrated capital markets [developed capital markets, stable economies, stable regulatory environment] the liquidity share in the DR decreases over time. For companies locally listed in segmented capital markets [less developed capital markets, less stable economies, less stable regulatory environment] the liquidity share in the DR increases over time.*

As outlined, quite a lot of companies decided to terminate their foreign listings due to a poor liquidity development; others, however, feared the foreign listing might even become too successful which in turn could lead to a shift of liquidity away from the local market and consequently to a decrease in local visibility.

Against this background, the results in the context of H1 to H5 are of special importance for companies that would like to cross list their shares in a foreign market. If the foreign liquidity fraction of companies locally listed in less developed countries increases over time to the detriment of the local listing, the companies have to be prepared to sacrifice local liquidity and visibility.

4 Data and Estimation Strategy

The empirical analysis is based on a data sample covering the years 1992 to 2010. Over the course of the first 15 years observed, the number of cross listings is steadily increasing from 55 in 1992 to a maximum of 379 in 2007. From 2007 to 2010 the number of DR programs included in the analysis decreased slightly to 304.

Other than related studies that exclusively focus on U.S. cross listings, this paper also covers DRs listed on the London-based LSI and LSE exchanges. With those two exchanges being the primary DR exchanges for two (Russia and India) of the three largest DR markets (Russia, India and Brazil), it is essential to also include those trading venues in order to get meaningful results.

All DR-programs (Level II and Level III ADR and GDR programs) still or formerly listed on the NYSE, the LSI and LSE have been identified and included in the analysis. The sample consists of a total of 574 cross-listed shares and their local equivalents, covering 44 countries which results in 57.312 listing-months observations. Out of the total of 574 depository receipts, 221 have been delisted within the 19 years observed. To prevent distortions coming from delistings due to corporate actions such as takeovers or insolvencies, all underlying stocks are required to be still actively traded.⁵

The ratio of foreign to local liquidity is calculated based on monthly aggregated turnover data converted to USD as taken from Datastream. The underlying price and volume data are adjusted for corporate actions such as splits.

To determine the degree of market integration on country level, two measures are applied. As a first measure, a variable assessing the direct access of foreign investors to local capital markets as composed by the Economic Intelligence Unit (EIU) is used. Due to the ordinal scaling of this variable, it is converted to a binary variable being 1 if the market is fully accessible and 0 otherwise.

As alternative proxy, the degree of market segmentation is calculated by each local capital market's correlation (measured by MSCI country indices) with the MSCI World Index. The correlations are calculated using weekly returns over a three year moving window.

The stage of capital market development is measured as its market capitalization as percent of GDP. The data is taken from the World Bank database. The economic stability of a country is measured using PRS economic risk scores as composed by the PRS Group. The measure is composed of a weighted average of risk points based on a country's GDP per capita, its real GDP growth, annual inflation rate, its budget balance as percent of GDP and its current account as percent of GDP. The state of a country's regulatory frame is evaluated

⁵ A detailed overview of the sample including a differentiation between listed and delisted DRs is given in the appendix.

using EIU scores measuring a country's investment protection schemes, its institutional effectiveness, the government's policy towards foreign direct investment and the stability of a country's financial regulatory system.⁶ Due to the ordinal nature of those variables, they have been converted to binary variables, being 1 if the country belongs to the top 20% of the respective scaling and 0 otherwise. Whereas monthly data is available for the PRS scores, the EIU and World Bank data are available on an annual basis. Companies' total assets used as control variable in the regression analysis are taken from the Factset Worldscope database.

To investigate the liquidity behavior cross-sectionally and over time, a panel regression approach is applied. The Hausmann specification test reveals that the differences in coefficients between the listings are systematic, e.g. correlated with the error term. Therefore, a fixed effects rather than a random effects model is applied.

Compared to a standard OLS regression, the fixed effects model estimator is based on the deviations of each observation from its time-mean rather than the observation level itself. This would result in a loss of all explanatory variables whose values are constant over time and are therefore equal to their time-means such as all binary dummy variables included in the regression model. To overcome this problem, all non-binary variables have been transformed into their deviation from time-means while the binary variables themselves enter the regression in their original form. In the presence of heteroskedasticity as detected by the Breusch-Pagan / Cook Weisenberg test, the regressions are run using robust standard errors. All regressions are conducted with a correction of AR(1) disturbances based on a panel of monthly data. The explanatory variables which are not constant over time are lagged by one period.

The models are constructed with and without time dummies to capture calendar year effects. In the following section, the regression results are displayed for both models

⁶ Please refer to the appendix to see a detailed overview of the different factors as composed by the Economist Intelligence Unit (EIU) and the PRS Group.

separately. To test the hypotheses related to foreign liquidity expressed as a fraction of local liquidity, we specify the following model:

$$\ln LR_{i,t} = \alpha + \beta_1 ES_{c,t-1} + \beta_2 ERS_{c,t-1} + \beta_3 IP_{c,t} + \beta_4 IE_{c,t} + \beta_5 GPFDI_{c,t} + \beta_6 FRS_{c,t} + \beta_7 FM_{c,t-1} + \beta_8 MVAG_{c,t-1} + \beta_9 \ln DIST_i + \beta_{10} \ln TA_{i,t-1} + \beta_{11} STDEV_{i,t-1} + \beta_{12} TECH_i + \beta_{13} MVAGD_{c,t-1} + \beta_{14} CD_{i,t-1} + \beta_{15} MsL_{i,t-1} + \beta_{16} SD_{i,t-1} + \sum_{m=17}^{36} \beta_m CY_m + \varepsilon_{i,t} \quad (1)$$

with:

- $LR_{i,t}$ = Liquidity ratio of listing i at month t (sum of turnover of DR listing / sum of turnover of local listing) [frequency: monthly] [deviation from time mean]
- $ES_{c,t}$ = Economic stability of country c in month t [frequency: monthly]
- $ERS_{c,t}$ = Exchange rate stability for country c at time t (dummy variable equal to 0 if the PRS criteria is below 8, and 1 otherwise) [frequency: monthly]
- $IP_{c,t}$ = Investment protection schemes in country c at time t (dummy variable equal to 0 if the EIU criteria is below 5, and 1 otherwise) [frequency: yearly]
- $IE_{c,t}$ = Institutional effectiveness rating of country c at time t (dummy variable equal to 0 if the EIU criteria is below 8, and 1 otherwise) [frequency: yearly]
- $GPFDI_{c,t}$ = Government policy towards foreign direct investment in country c at time t (dummy variable equal to 0 if the EIU criteria is below 5, and 1 otherwise) [frequency: yearly] [deviation from time mean]
- $FRS_{c,t}$ = Financial regulatory system in country c at time t (dummy variable equal to 0 if the EIU criteria is below 5, and 1 otherwise) [frequency: yearly]
- $FM_{c,t}$ = Integration measure of capital market c at time t (a) EIU measure “access of foreigners to local market (dummy variable equal to 1 if the EIU criteria is below 5, and 0 otherwise) [frequency: yearly] or b) correlation of country index with MSCI World (measured over three year moving window of weekly returns) [frequency: monthly]
- $MVAG_{c,t}$ = Market capitalization of country c divided by GDP at time t [frequency: yearly] [deviation from time mean]
- $DIST_{i,t}$ = Geographic distance between city of local exchange and London resp. New York
- $TA_{i,t}$ = Total assets of company i in month t [frequency: yearly] [deviation from time mean]
- $STDEV_{i,t}$ = Volatility of company i in month t (measured over three year moving window of weekly returns) [frequency: monthly] [deviation from time mean]
- $TECH_i$ = Dummy variable equal to 1 if company belongs to the tech sector, 0 otherwise
- $MVAGD_{c,t}$ = Market capitalization of market where DR is listed (U.S. or U.K.) divided by GDP at time t [frequency: yearly] [deviation from time mean]
- $CD_{i,t}$ = Dummy variable equal to 1 if foreign listing is in the U.S., 0 otherwise
- $MsL_{i,t}$ = Months elapsed since initial listing [frequency: monthly] [deviation from time mean]
- $SD_{i,t}$ = Dummy variable equal to 0 if foreign listing has been terminated over the course of the period observed, 1 otherwise
- CY_m = Binary variables for years 1992-2010 equal to 1 in respective year and 0 otherwise

To test the hypotheses related to the foreign and the local liquidity rather than the ratio of both measures as dependent variable, two additional regression-models are constructed:

$$\ln LF_{i,t} = \alpha + \beta_1 ES_{c,t-1} + \beta_2 ERS_{c,t-1} + \beta_3 IP_{c,t} + \beta_4 IE_{c,t} + \beta_5 GPFDI_{c,t} + \beta_6 FRS_{c,t} + \beta_7 FM_{c,t-1} + \beta_8 MVAG_{c,t-1} + \beta_9 \ln DIST_i + \beta_{10} \ln TA_{i,t-1} + \beta_{11} STDEV_{i,t-1} + \beta_{12} TECH_i + \beta_{13} MVAGD_{c,t-1} + \beta_{14} CD_{i,t-1} + \beta_{15} MSL_{i,t-1} + \beta_{16} SD_{i,t-1} + \sum_{m=17}^{36} \beta_m CY_m + \varepsilon_{i,t} \quad (2)$$

with:

$LF_{i,t}$ = Sum of monthly turnover of foreign listing [frequency: monthly] [deviation from time mean]

$$\ln LL_{i,t} = \alpha + \beta_1 ES_{c,t-1} + \beta_2 ERS_{c,t-1} + \beta_3 IP_{c,t} + \beta_4 IE_{c,t} + \beta_5 GPFDI_{c,t} + \beta_6 FRS_{c,t} + \beta_7 FM_{c,t-1} + \beta_8 MVAG_{c,t-1} + \beta_9 \ln DIST_i + \beta_{10} \ln TA_{i,t-1} + \beta_{11} STDEV_{i,t-1} + \beta_{12} TECH_i + \beta_{13} MVAGD_{c,t-1} + \beta_{14} CD_{i,t-1} + \beta_{15} MSL_{i,t-1} + \beta_{16} SD_{i,t-1} + \sum_{m=17}^{36} \beta_m CY_m + \varepsilon_{i,t} \quad (3)$$

with:

$LL_{i,t}$ = Sum of monthly turnover of local listing [frequency: monthly] [deviation from time mean]

Various control variables are included that, as related studies point out (e.g. Halling et al. (2008)), might also influence the liquidity distribution between the foreign and the local listing.

Information is of essential importance for stock trading. If no information with regard to a given stock is available, a stock transaction that usually occurs if two investors have different expectations with regard to the future development of the value of a stock is quite unlikely to occur. Therefore, information should be positively correlated with the number of stock transactions. It is further assumed that the most information about a company is usually found on its home market. To proxy for the degree of information available on a foreign market, the geographical distance between the respective local exchange and the city of the foreign exchange (New York or London) is included in the regression. As further proxy for the degree of information available abroad, company size is included in the analysis. The smaller a company, the less information about the company should be available in foreign

markets. To evaluate the fair value of companies characterized by high return volatility, the degree of information required is supposed to be higher than it is for companies with lower volatility. The underlying reasoning is that the higher the volatility, the higher the uncertainty about the fair value of a company and the more important information about a company becomes. Therefore, stock price volatility as measured over a three year moving window of weekly returns is included as control variable.

In recent years, U.S. exchanges became quite popular to be listed on for technology oriented companies from abroad. High expertise with regard to tech-companies is supposed to be concentrated there. Therefore, the liquidity in the foreign listing of tech-companies is supposed to be relatively higher than for companies from other industries. To control for this effect, a binary variable is included being 1 if the company belongs to the ICB technology sector and 0 otherwise.

As the liquidity in the depository receipts might also be influenced by the condition of the respective target markets (U.S. or U.K.), their market capitalization scaled by GDP is included as control variables. Further potential differences in the liquidity allocation between U.S. and U.K. listed depository receipts are captured in a dummy variable being 1 if the DR is listed in the U.S. and 0 otherwise. Finally, a binary variable being 1 if the depository receipt is still actively traded and 0 otherwise is included to control for potential effects associated with the delisting process.

5 Empirical Results

Table 1 summarizes the regression results. The results for the foreign to local turnover as dependent variable are given in columns 1 and 2. The results as reported in column 1 are based on regressions including calendar year dummies, whereas the regression results displayed in columns 2 are not controlled for calendar year effects. Columns 3-4 as well as 5-

6 report the respective outcome for the foreign and local turnover separately instead of the ratio of both as dependent variable.

<<< Table 1 about here >>>

To test for multicollinearity, variance inflation factors have been calculated for each explanatory variable in each regression. With the exception of the foreign markets' capitalization (10.2), variance inflation factors (VIF) are well below 10. With a value of 2.8, the variable Investment Protection Schemes (IP) has the highest VIF of all non calendar year dummy variables.

Furthermore, two Wald tests for the joint significance of the explanatory variables are conducted per regression model; one test comprising time dummies and one comprising all remaining variables. The null hypothesis of the respective variables being zero is rejected in every scenario.

In the following, the empirical results are presented and discussed in order of the hypotheses stated. The focus lies on the model including calendar year dummies. In case results vary compared to the model without calendar year dummies, it is explicitly pointed out.

The EIU criteria "access of foreigners to the local capital market" is significantly negatively related to the ratio of foreign to domestic trading volume. Thus, the better a local capital market is integrated into the world capital market, the more liquidity is concentrated in the local market (comp. IM in Table 1). The share of foreign trade of companies resident in countries with well integrated capital markets is on average 2.26% smaller compared to companies resident in semi-integrated or segmented markets.

Looking at each listing, local and foreign, separately, reveals quite interesting results. Whereas the liquidity in the foreign listing is, as hypothesized, significantly lower for companies locally listed in integrated markets compared to companies listed in semi-integrated or segmented markets, the integration of the local market seems to have no effect

on the liquidity of the local listing. Thus, an improvement in market accessibility therefore leads to a decrease in foreign liquidity, but does not seem to cause a direct reallocation of liquidity from the foreign back to the local listing.

An increase in capital market development as measured by its market capitalization scaled by GDP (MVAG) is found to lead to a statistically significant decrease in foreign relative to local liquidity. In line with hypothesis H2, an increase in the local capital market development therefore is more favorable for the local than for the foreign listing's liquidity.

A look at the liquidity reactions of both listings when regarded separately reveals that this time, the liquidity of both listings increases, but with an increase in local liquidity being more pronounced than the increase in foreign liquidity. An increase in the market capitalization as percent of GDP by one standard deviation, e.g. 0.63, leads to an increase in local liquidity by 5.40% compared to its mean whereas it only increases the foreign liquidity by 3.44%. This unbalanced reaction of the two listings explains the overall decrease in the ratio of both measures (a decrease of 2.21% relative to its mean).

The regression results further show that the economic stability (ES) of a country exerts a positive and significant influence on the liquidity of the local listing. An increase by one standard deviation (4.24) of the stability indicator's mean (38.1) leads to an increase in local liquidity by 1.6%. But other than hypothesized, the foreign liquidity is found to be even negatively influenced by an improvement in this variable, it decreases by 1.80% compared to its mean, everything else being equal.

The influence of a second variable used to assess economic stability, a country's exchange rate stability however, is found to be in line with the hypotheses stated. An increase in the exchange rate stability exerts a significantly positive influence on the liquidity of both listings. Whereas the local liquidity increases by 2.15% relative to its mean, the foreign liquidity increases by even 4.6%. Although depository receipts are denominated in USD, their price is linked to the underlying stock which is listed and traded in the respective local

currency. If the local currency loses in value compared to the USD, so does the value of the depository receipt. Therefore, a more stable exchange rate has a positive influence on both listings.

In line with hypothesis H3.1, an increase in the economic stability of a country has a negative influence on foreign liquidity as fraction of local liquidity. Due to the decrease in foreign and increase in the local liquidity, the effect on the ratio of foreign to local liquidity is negative with -3.54% compared to its mean (everything else kept constant).

The variables that capture the regulatory environment reveal quite diverse results. A better local *financial regulatory system* leads to an increase in local liquidity. The increase is significant with 3.31% compared to the liquidity of companies resident in markets with an inferior regulation. The foreign liquidity on the other hand decreases by 2.33%. The net effect on the ratio of foreign to domestic trade is negative (-6.38%). Thus, an improvement in a country's financial regulatory system leads to a direct reallocation of liquidity away from the foreign into the local market.

Local liquidity of companies resident in countries that have a *government policy towards foreign direct investment* that ranks among the most beneficial is found to be about 2% higher compared to the local liquidity of companies resident in countries with a less favorable attitude towards foreign investment. Foreign liquidity, however, cannot profit from an increase in this variable. Consequently, the net effect on the ratio of foreign to domestic trading is negative which leads to a significant decrease in the liquidity ratio of -2.42%.

An increase in the *institutional effectiveness* of a country is found to have a positive effect on both, the liquidity of the foreign (+4.73%) and the local listing (+1.84%). The dominance of this effect on the liquidity of the foreign listing leads to a positive effect also on the ratio of foreign to local liquidity (+4.63%).

Other than the effects coming from a better financial regulatory system and a more beneficial policy towards foreign investment that either lead to a direct reallocation of

liquidity back to the home market or to a decrease of foreign liquidity, more effective local institutions not only exert a positive influence on the local but also on the foreign listing.

The quality of *investment protection schemes* in the local market is found to have no significant influence on the liquidity allocation.

Based on the entire sample of observations, the time is found to exert a significantly negative influence on the fraction of foreign liquidity. But taking a look at both the foreign and the local liquidity separately reveals that the negative influence of time on the liquidity fraction is primarily driven by an increase in local liquidity rather than a steep decrease in foreign liquidity. In fact, the liquidity in the foreign listing only slightly decreases whereas the increase in local liquidity is three times as high. This picture is even more pronounced in the model without calendar year dummies. The second model also reveals a strong increase in local liquidity but no reduction of liquidity in the foreign listing. These findings seem to contradict the concentration hypothesis stating that over time, liquidity should always concentrate on one exchange.

Hypotheses H5 now states that the influence of time on the liquidity allocation itself depends on the variables used in this paper to capture the degree of market development (capital market segmentation, capital market development, economic stability, and the regulatory environment). In order to test this hypothesis, the full sample of observations is split into sub-samples according to the respective indicators for market development. The influence of time on the ratio of foreign to domestic turnover as it depends on different degrees of market development is shown in Tables 2-6. To cluster according to market development, the variables 1) correlation of the local capital market with the integrated world capital market, 2) foreigners' access to the local capital market, 3) the state of capital market

development as measured by the local market capitalization scaled by GDP (MC/GDP), 4) a country's economic development and 5) its regulatory environment are applied.⁷

<<< Tables 2 to 6 about here >>>

Correlation: As hypothesized, for local markets that display the highest correlation with the integrated world market, the fraction of foreign liquidity decreases relative to its local equivalent over time as captured by the negative beta-factor of the variable “months elapsed since the initial cross listing” (MsL) (see Table 2). But other than expected, this trend is even increasing rather than decreasing with decreasing correlation. Thus, the general trend of liquidity to develop relatively more heavily on the local market over time is even more pronounced in less integrated markets. This result contradicts earlier findings which observed that the attractiveness of foreign trade has increased over time for emerging market firms whereas for developed markets companies, it decreased. For the markets that display the lowest integration into the world market (correlation with the MSCI World Index of less than 0.4) no significant trend could be observed.

Access of foreigners to local capital market: Using the EIU measure “access of foreigners to the local capital market” as proxy for market integration, this trend is generally supported (Table 3). For companies listed in well integrated markets (access of foreigners = 1) the foreign liquidity fraction is found to significantly decrease over time. For companies locally listed in less integrated or segmented markets (access of foreigners = 0), the trend towards a re-concentration of liquidity on the local exchange is even more pronounced.

Market cap scaled by GDP: A similar picture reveals the construction of subsamples according to the variable market capitalization scaled by GDP as proxy for capital market development. Whereas in the groups of countries with very high market capitalizations

⁷ For brevity, only the regression results based on the model including calendar year dummies are reported in tables 2-6. In case the results for the model without the inclusion of time dummies deviate, it is explicitly pointed out.

relative to their GDP ($MC/GDP > 2$) no significant results could be detected (which is due to the small size of companies in these clusters), the liquidity fraction is significantly negative for all other sub-samples. The trend towards a local re-concentration of liquidity more than doubles from the sub-sample comprising markets with a MC/GDP-ratio between 1 and 2 compared to the sample with a ratio between 0.5 and 1. It then slightly decreases again for markets with a MC/GDP-ratio below 0.5.

Economic development: More in line with hypothesis H5, however are the results built on sub-samples according to the economic stability indicator. For companies resident in countries that display the highest degree of economic development, the foreign liquidity fraction significantly decreases over time. This trend then decreases with decreasing economic development but other than hypothesized, remains negative (Table 5).

Regulatory environment: With regard to the regulatory environment, two subsamples are constructed. The first sample consists of local listings of only those countries that have the best scores in the respective classes ($IP=1$; $IE=1$; $GPFDI=1$ and $FRS=1$) whereas the second sample contains local listings of only those countries that have a value of zero for all measures. Primarily due to the limited number of companies selected, the regressions reveals no significant results.

The overall results however are quite surprising as they contradict the initial hypothesis that liquidity attracts more liquidity, therefore, leading to a liquidity concentration on the exchange where liquidity is highest.

The last column of Tables 2-6 displays the median foreign liquidity fractions for all sub-samples. As expected, they are the higher the less developed the respective markets. Following the concentration hypothesis, the trend towards local re-concentration, if existing, should be the more pronounced the lower the fraction of foreign liquidity, thus, the more liquidity is already concentrated locally. The empirical results however, display the exact

opposite picture: the higher the fraction of foreign liquidity, the stronger the trends towards a relative re-allocation of liquidity back home.

Control Variables: In line with the findings of Halling et al. (2008), the size of a company (TA), measured by its total assets, is significantly positively related to the fraction of foreign to local liquidity. An increase in total assets by one standard deviation from the mean leads to an increase in the liquidity ratio of 14.6%. The effect is found to be positive on both, the local and the foreign liquidity but is far stronger for the foreign listing (49.5%) than for the local listing with an increase of 35.4% relative to the mean. This is in line with the assumption that the larger the company the more information is available abroad.

A companies' standard deviation (Stdev_3Y) as measure for risk or uncertainty with regard to its fair value is negatively related to the liquidity ratio only in the model without time dummies. In the standard model, no statistically significant influence is detected. Thus, the empirical support for the hypothesis that companies which are characterized by higher volatility are more heavily traded at the local exchange where the information available to properly evaluate those companies is highest, is restricted.

The distance (DIST) between the local and the foreign exchange is found to have no significant influence on the liquidity allocation. This contradicts earlier findings.

The foreign liquidity of cross listed companies from the technology sector (Tech) is found to be significantly lower than for companies from the classic sector (-3.5%). However, it is found to exert no significant influence on the ratio of foreign to domestic trade.

The market capitalization of the respective foreign target market (U.K. or U.S.) scaled by GDP (MVAGD) exerts a positive influence on the liquidity of the foreign listing. An increase by one standard deviation, e.g. 0.26 relative to the mean (1.29) leads to an increase in foreign liquidity of 7.19%. This underscores that not only the local market's but also the target markets conditions matter in determining the liquidity allocation of cross listed stocks.

Further, the regression results clearly indicate that the fraction of foreign liquidity is significantly smaller (-6.09%) for cross-listings that have been terminated over the course of the period examined compared to the cross listings which are still existent. Lastly, the local liquidity of companies cross listed in the U.K. is found to be by 3.35% lower compared to the local liquidity of companies that cross list in the U.S.

6 Conclusion

The empirical results show that the fraction of trading that occurs in the foreign listing is the smaller the more integrated and the better developed the local capital market is. This finding is of essential importance for companies resident in segmented markets that evaluate whether to cross list their shares abroad in order to overcome market segmentation and lower their cost of capital.

If market segmentation is expected to be of transitory nature, liquidity will always re-concentrate locally if the local capital market integrates over time. Therefore, a cross listing is economically justified as it overcomes a non-persisting weakness of the local market at a given point in time. However, companies have to be aware that foreign liquidity will revert to the local listing if the local capital market starts to integrate.

But what should be done if a low stage of market development is expected to persist? Earlier studies (e.g., Halling et al. (2008), Levine and Schmuckler (2006)), found a relative increase in the foreign trading to the detriment of the local listing over time. In this environment, a foreign listing would only be rational if the expected decrease in the cost of capital is more heavily valued than a loss of local liquidity and potential market visibility.

The empirical results of this paper however contradict such earlier findings. They clearly show that, controlling for other factors, the liquidity in the local share increases over time, whereas the foreign liquidity tends to decrease. This trend is found to be the more pronounced the less developed the local market and the higher the current share of foreign

liquidity which contradicts the concentration hypothesis. These results should alleviate the fear to lose local liquidity to the foreign listing; especially for companies that do not expect their local market's conditions to improve in the near future.

Against this background, the more important question to be answered is whether it makes sense to even consider a potential cross-listing for companies locally listed in less developed markets if the increase in their local stocks' liquidity is found to be even more pronounced compared to cross listed companies resident in developed markets; especially as the liquidity in the foreign listing is found to slightly decrease.

As discussed in section 2, the primary goal linked to a cross listing is to decrease a company's cost of capital. Whereas a high foreign liquidity, as a sign for the presence of international investors that do not require an extra risk-premium, does significantly contribute to achieve this goal, a cost reduction can also be achieved with the pure act of cross-listing itself, without the need to attract a substantial base of foreign investors. This is the case whenever the information disclosure or the investor protection increases as a consequence of the cross-listing.

Finally, the empirical results display that, next to capital market segmentation and development, the economic stability as well as the reliability on a country's regulatory system play an important role in explaining liquidity allocation. While a more stable local economy and an improvement in the regulatory frame in the form of a better local financial regulatory system lead to a direct reallocation of foreign to local liquidity, an increase in the local institutions' effectiveness has a beneficial effect not only on the local but also on the foreign liquidity.

Appendix

Table A.1: EIU and PRS ratings as applied in the analysis

Risk Indicators	Range	Direction	Description
Economic Risk (PRS)	1-10	(10=low risk)	The PRS economic risk indicator is composed of a weighted average of risk points based on a country's GDP per head, its real GDP growth, annual inflation rate, its budget balance as percent of GDP and its current account as percent of GDP.
Access of foreigners to local market (EIU)	1-5	(5=good)	The EIU's access of foreigners rating scores countries between 1 and 5 on the access of foreigners to the local capital market, with 1 being "very poor" and 5 being "very good".
Exchange Rate Risk (PRS)	1-10	(10=low risk)	The appreciation or depreciation of a currency against the US dollar (against the euro in the case of the USA) over a calendar year or the most recent 12-month period is calculated as a percentage change. The results are then transferred to risk points ranging from 1 (very high risk) to 10 (very low risk).
Financial Regulatory System	1-5	(5=high quality)	The EIU's business environment rankings quantify the attractiveness of the business environment. The quality of the financial regulatory system rating scores countries between 1 and 5, with 1 being "very poor" and 5 being "very good".
Government policy towards foreign investment	1-5	(5=good)	The EIU's business environment rankings quantify the attractiveness of the business environment. The government policy towards foreign investment rating scores countries between 1 and 5, with 1 being "very restrictive" and 5 being "very encouraging".
Institutional effectiveness rating	1-10	(10=high)	The EIU's business environment rankings quantify the attractiveness of the business environment. The institutional effectiveness rating scores countries between 1 and 10, with 1 being low and 10 being high.
Investment protection schemes	1-5	(5=good)	The EIU's business environment rankings quantify the attractiveness of the business environment. The availability of investment protection schemes rating scores countries between 1 and 5, with 1 being "very poor" and 5 being "very good".
Transparency and fairness of legal system	1-5	(5=high)	The EIU's government stance towards business rating scores countries between 1 and 5 on the transparency and fairness of legal system, with 1 being "very low/unfair" and 5 being "very high/fair".

Table A.2: Overview – Summary of sample

Country	Status	Number of Cross-Listings
Argentina	delisted	3
Argentina	still listed	14
Australia	delisted	12
Australia	still listed	7
Austria	delisted	1
Belgium	still listed	2
Brazil	delisted	2
Brazil	still listed	31
Chile	delisted	9
Chile	still listed	12
China	still listed	13
Colombia	still listed	2
Czech Republic	still listed	2
Denmark	delisted	1
Denmark	still listed	2
Egypt	still listed	9
Finland	delisted	3
Finland	still listed	1
France	delisted	17
France	still listed	6
Germany	delisted	11
Germany	still listed	6
Greece	delisted	1
Greece	still listed	4
Hong Kong	delisted	5
Hong Kong	still listed	3
Hungary	delisted	2
Hungary	still listed	3
India	delisted	22
India	still listed	40
Indonesia	delisted	2
Indonesia	still listed	3
Ireland	delisted	2
Ireland	still listed	8
Israel	delisted	7
Israel	still listed	6
Italy	delisted	6
Italy	still listed	4
Japan	delisted	12
Japan	still listed	21
Mexico	delisted	8
Mexico	still listed	20
Netherlands	delisted	5

Netherlands	still listed	4
New Zealand	delisted	2
New Zealand	still listed	1
Nigeria	still listed	2
Norway	delisted	3
Norway	still listed	1
Pakistan	still listed	5
Peru	delisted	2
Peru	still listed	1
Philippines	still listed	3
Poland	delisted	5
Poland	still listed	3
Portugal	delisted	1
Portugal	still listed	1
Russia	delisted	5
Russia	still listed	37
Singapore	delisted	1
South Africa	delisted	8
South Africa	still listed	6
South Korea	delisted	14
South Korea	still listed	21
Spain	delisted	2
Spain	still listed	5
Sweden	delisted	11
Sweden	still listed	1
Switzerland	delisted	4
Switzerland	still listed	4
Turkey	delisted	4
Turkey	still listed	5
United Kingdom	delisted	28
United Kingdom	still listed	32
United States	still listed	1
Vietnam	still listed	1

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Table 1: Regression results for entire sample

The results are given for regressions with and without calendar time dummy variables.
 ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	ln(FL/LL)		ln(FL)		ln(LL)	
	Calendar year dummies included	No calendar year dummies included	Calendar year dummies included	No calendar year dummies included	Calendar year dummies included	No calendar year dummies included
EconomicS (ES)	-0.0085 ***	-0.002	-0.0043 ***	0.0012	0.0038 ***	0.0041 ***
ExchangeRateS (ERS)	0.0262 *	0.0419 ***	0.0453 ***	0.0637 ***	0.0213 **	0.0274 ***
InvestmentP (IP)	0.0155	0.0108	0.009	0.0065	-0.0059	-0.003
InstEff (IE)	0.0454 ***	0.0482 ***	0.0462 ***	0.0507 ***	0.0182 *	0.0178 *
GovPolFDI (GPFDI)	-0.0245 **	-0.0202 **	0.0054	-0.0015	0.0196 **	0.0096
FinancialRS (FRS)	-0.0659 ***	-0.0503 ***	-0.0236 *	-0.0192 *	0.0326 ***	0.0219 ***
AccessF (IM)	-0.0229 *	-0.025 *	-0.025 **	-0.0218 *	-0.012	-0.0058
MC/GDP (MVAG)	-0.0354 **	-0.0771 ***	0.0536 ***	0.0519 ***	0.0836 ***	0.1203 ***
LnDist	0.0053	0.0084	0.0124	0.0143	0.0108	0.0097
LnTA	0.0661 ***	0.0288 ***	0.1951 ***	0.1846 ***	0.1469 ***	0.1696 ***
Stdev_3Y	-0.025	-0.9463 ***	-0.1323	-1.6259 ***	0.0051	-0.8802 ***
Tech	-0.0169	-0.0206	-0.0356 ***	-0.0346 ***	-0.0174 *	-0.0136
MVAGD	0.1613 **	0.1668 ***	0.2655 ***	0.1637 ***	0.022	0.0216
CD	0.0029	0.0131	0.0019	-0.0038	-0.0341 ***	-0.0454 ***
MsL	-0.0006 ***	-0.0007 ***	-0.0001 *	-0.0001	0.0003 ***	0.0005 ***
SD	0.0628 ***	0.0324 ***	0.0349 ***	0.034 ***	-0.0109 *	0.0093
_cons	0.0293	-0.1004	-0.1084	-0.2085 **	-0.1822 ***	-0.1123 *
R ²	0.5186	0.5165	0.6694	0.668	0.7033	0.7015

Table 2: Beta-coefficients for variable “months elapsed since initial cross-listing” for sub-samples based on correlation intervals

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Measure	Variable	Coef. (*10.000)		R ²	Median liquidity fraction (foreign to local)
0.8 < Correl <=1	MtL	-4.185 ***		0.6329	0.038
0.6 < Correl <=0.8	MtL	-9.044 ***		0.4739	0.053
0.4 < Correl <=0.6	MtL	-9.857 ***		0.4919	0.144
0.2 < Correl <=0.4	MtL	2.686		0.6296	0.283
Correl <=0.2	MtL	2.881		0.5746	0.555

Table 3: Beta-coefficients for variable “months elapsed since initial cross-listing” for sub-samples based on EIU criteria “access of foreigners to the local capital market”

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Measure	Variable	Coef. (*10.000)		R ²	Median liquidity fraction (foreign to local)
IM=1	MtL	-6.353 ***		0.5335	0.038
IM=0	MtL	-6.616 ***		0.5143	0.154

Table 4: Beta-coefficients for variable “months elapsed since initial cross-listing” for sub-samples based on market cap scaled by GDP

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Measure	Variable	Coef. (*10.000)		R ²	Median liquidity fraction (foreign to local)
MC/GDP>4	MtL	6.641		0.4945	0.142
3 < MC/GDP <=4	MtL	-2.992		0.5237	0.097
2 < MC/GDP <=3	MtL	8.547		0.7076	0.086
1 < MC/GDP <=2	MtL	-3.286 **		0.5246	0.041
0.5 < MC/GDP <=1	MtL	-7.998 ***		0.4935	0.044
MC/GDP <=0.5	MtL	-6.198 ***		0.5392	0.298

Table 5: Beta-coefficients for variable “months elapsed since initial cross-listing” for sub-samples based on economic stability

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Measure	Variable	Coef. (*10.000)		R ²	Median liquidity fraction (foreign to local)
EconomicS (ES) >45	MtL	-17.87 ***		0.5392	0.052
40 < EconomicS (ES) <= 45	MtL	-7.111 ***		0.5028	0.049
35 < EconomicS (ES) <= 40	MtL	-6.227 ***		0.5336	0.086
EconomicS (ES) <= 35	MtL	-5.754 **		0.5117	0.199

Table 6: Beta-coefficients for variable “months elapsed since initial cross-listing” for sub-samples based on EIU scores assessing regulatory environment

***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Measure	Variable	Coef. (*10.000)	R ²	Median liquidity fraction (foreign to local)
IP, IE, GPFDI, FRS =1	MtL	-2.601	0.591	0.015
IP, IE, GPFDI, FRS =0	MtL	-5.527	0.5285	0.329