Article:
Valuation effects of termination of cross-listings

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Executive summary

Valuation effects of termination of cross-listings

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In the past, segmentation of capital markets, in particular of developing countries, incentivized numerous companies to cross-list in more integrated and mature markets by promising better investor recognition and thereby lowering cost of capital and increasing stock liquidity. In recent years, however, more and more companies have decided to terminate these dual listings in a foreign country. This paper investigates share price effects linked to the termination of cross-listings. There is a special focus on the characteristics of companies' home markets to explain observed price effects. The empirical results suggest that markets react negatively to the announcement of the termination of the secondary listing, both on the day of the announcement and for a few weeks afterwards. This evaluation even holds for companies that are locally listed on already well-integrated stock exchanges.

Valuation effects of termination of cross-listings

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Abstract
In the past, segmentation of capital markets incentivized numerous companies to cross-list in more integrated markets by promising better investor recognition and thereby lowering cost of capital and increasing stock liquidity. In recent years, however, more and more companies have decided to terminate these dual listings. In contrast to previous studies, which mainly focus on the benefits and/or drawbacks of the initial cross-listings, this paper investigates share price effects linked to the termination of cross-listings. A special focus lies on the characteristics of companies' home markets to explain observed price effects. The empirical results show negative abnormal returns on the event date as well as negative cumulative abnormal returns in the weeks following the announcement of the termination of the secondary listing. The absolute value of the price reaction varies positively with foreign investors' difficulty to enter the companies' local market and the fraction of liquidity allocated to the foreign listing prior to the delisting event.

1. Introduction

Empirical studies on initial cross-listings have found positive abnormal stock returns around the announcement date of the secondary listing.[1] This observation has typically been explained by the ability of these firms to overcome the market segmentation disadvantages of purely locally listed companies. Without the ability to tap international capital markets, companies resident in segmented markets are assumed to face higher equity costs imposed by local investors that cannot diversify unsystematic country risk. As companies are moving from a segmented to an integrated market, a positive revaluation effect sets in as the minimum required return of equity investors falls.

Given this reasoning, it is surprising that an increasing number of companies — not only well-known European corporations, such as Ahold, Air France, Bayer, British Airways, Danone and Fiat [Dobbs and Goedhart (2008)], but also companies resident in emerging markets — have in recent years decided to delist from well integrated stock exchanges, such as the New York Stock Exchange. Several factors may explain why the termination of a foreign listing should go hand in hand with a negative share price reaction. Predominant, seems to be a rise in the company's cost of capital, especially when the home market is not integrated at the time of the delisting. While potential implications of initial cross-listings have been extensively studied in the literature, the effects of delistings have been investigated by merely a handful of recent studies and with mixed results. This is mainly due to the fact that the trend to delist has only gained momentum in the last few years.

In this paper, we examine whether the termination of a secondary market listing leads to a reversal of positive share price reactions commonly observed around the initial cross-listing announcement. To our knowledge, this is the first study that explicitly analyzes the impact of capital market segmentation/integration on abnormal returns at the time of delisting announcements. This study in particular investigates the role that the degree of development and accessibility of local stock markets at the time of the delisting announcement have in explaining delisting-related abnormal returns. The expectation should be that abnormal returns are smaller, the higher the degree of the local market's segmentation at which the company terminates its cross-listing.

The empirical results show significant negative abnormal returns on the event date as well as negative cumulative abnormal returns in the weeks following the announcement of the termination of a secondary listing. The magnitude of the price reaction varies positively with the difficulty of foreign investors entering the companies' local market as well as the fraction of liquidity allocated to the foreign listing prior to the delisting event.

The remainder of the paper is structured as follows: The next section presents the economic rationale underpinning cross-listing and cross-delisting. Section 3 provides the determinants of price reactions observed around cross-listings and cross-delistings based on a review of the literature, and derives the corresponding hypotheses to be tested. Section 4 describes the data and the estimation approach. The empirical results are summarized and interpreted in section 5. Section 6 concludes.

2. Reasons to list and delist depository receipts

Related research has identified market segmentation as the primary motivation for companies to cross-list their shares. Companies are able to lower their cost of capital by making their stock tradable on exchanges characterized by a higher degree of financial market integration. Jorion and Schwartz (1986) define market integration as a state where investors earn the same risk-adjusted expected return from similar financial instruments, independent of the exchange on which the shares are traded. Similarly, Bekaert and Harvey (1995) argue that companies listed locally in completely integrated capital markets should have the same stock returns for a given level of risk irrespective of their domicile country. In this case, return variance is replaced by the stock's covariance to the integrated world capital market. In contrast, if a market is completely segmented, the stock's covariance with a given world factor does not exist and thus, investors' expected returns are related to the company's total risk.

The reasons for market segmentation are manifold. They might arise from investors' limitations, such as the lack of information about the target market, fear of expropriation, or discriminatory tax treatment abroad. Moreover, capital controls may restrict foreigners' access to local capital markets and reduce their

1 This paper focuses on cross-listed shares in form of American Depository Receipts (ADRs), formerly cross-listed on U.S. stock exchanges (Level II and Level III DR programs).

freedom to repatriate 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. Given the above definition based on the law of one price, it follows that a corporation's decision to list shares outside of a segmented or semi-integrated market has direct consequences for the investor's required rate of return and in turn for the firm's cost of capital.

Based on Markowitz' (1952) portfolio selection theory, local investors resident in segmented capital markets require a premium for investing in a local company's equity and not being optimally diversified.[2] Companies may, therefore, be able to significantly reduce their cost of capital by escaping local segmentation and tapping global capital markets. Unlike locally restricted investors, global investors do not require a risk premium for the specific country risk. Due to the lower expected cost of capital, numerous empirical studies observed abnormal positive returns causing a general rise in the corporation's share price around the announcement date of a cross-listing. Given this evidence, it is worthwhile investigating why increasing numbers of companies are reversing their initial decision to cross-list and terminate their foreign listing.

One explanation often cited is the balance between the so-called "bonding" and the "loss of competitiveness theory." "By subjecting themselves to U.S. 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 et al. (2008)] Companies that are resident in countries with lower legal and institutional standards should especially benefit from a commitment to stricter disclosure requirements linked to a secondary listing on one of the major U.S. stock exchanges. Meeting the more extensive disclosure requirements, however, also induces higher costs and complexity, e.g., due to the Sarbanes Oxley Act (SOX) to which companies cross-listed on U.S. stock exchanges have been subjected since 2002. This Act, enforced by the Securities and Exchange Commission (SEC), requires a strict internal control system. Compliance demands costly monitoring of internal business processes, which may result in a loss of competitiveness.[3] Thus, the decision to terminate a secondary listing can indeed be legitimatized when the net benefits related to maintaining a cross-listing are no longer present.

In particular, for companies locally listed in well integrated and easily accessible markets, there should be no need to overcome market segmentation by cross-listing their shares on a foreign exchange. Moreover, the standard of information disclosure required by exchanges in developed markets is already significant and companies typically disclose a high level of information to outside investors even without being SOX compliant. Thus, with the positive effects derived from increased integration and better disclosure being negligible, the net benefits of a cross-listing in the U.S. may easily become negative for companies locally listed on well-integrated stock exchanges. This may have driven larger firms that are listed locally in well-developed and integrated capital markets to delist in recent years.[4]

3. Valuation effects around cross-delistings

3.1 From cross-listing to cross-delisting

The positive revaluation effect of an international listing induced various researchers to pay special attention to potential price reactions around the announcement date of the initial cross-listing. Torabzadeh et al. (1992), Lau et al. (1994), Miller (1999), Foerster and Karoly (1999), Litvak (2008), and Roosenboom and van Dijk (2009), for instance, observe positive abnormal returns around the announcement date of a depository receipt (DR) listing. Kadlec and McConnell (1994) even derive abnormal returns of about 5% in response to the cross-listing announcement.

2 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. In contrast, Hietala (1989) hypothesized that investors who are restricted from diversifying internationally might require a higher rate of return on local stocks, since they are not able to diversify away the specific country risk.

3 This assumption is backed by Zingales (2006) who observed a significant decrease in the U.S. share of global IPOs between 2000 and 2005. Next to an increase in the competitiveness of non-U.S. capital markets, he relates his findings to an increase in the compliance costs for companies publically traded in the U.S.

4 The extremely difficult and often costly process of deregistering from the SEC has previously prevented companies from delisting. However, the trend to delist increased significantly in the wake of the "first significant deregulation of U.S. disclosure requirements since the passage of the 1933/1934 Exchange and Securities Acts: the 2007 Securities and Exchange Commission (SEC) Rule 12h-6. The Rule 12h-6 has facilitated foreign firms to deregister with the SEC and thereby terminate their U.S. disclosure obligations. [Fernandes et al. (2010)] Companies that formerly cross-listed shares on U.S. stock exchanges are since then allowed to "deregister with the U.S. Securities and Exchange Commission if less than 5% of global trading takes place on U.S. stock exchanges." [Dobbs and Goedhart (2008)]

In an attempt to disentangle the sources of abnormal returns around cross-listings, Miller (1999) finds that the extent of the stock price reaction depends on the stage of the local stock market development. He discovers positive revaluation effects to be significantly larger for firms listed locally in emerging markets as compared to those located in developed markets. Serra (1999) compares the revaluation effects of emerging market companies with a control sample of European firms that both cross-listed on U.S. and U.K. stock exchanges. In line with Miller (1999), she observes a significantly more pronounced effect of abnormal positive returns for dual-listed companies resident in emerging markets.

By focusing on a global set of firms cross-listing their shares on U.S. exchanges, Bris et al. (2007) attempted to determine the impact of market segmentation, liquidity, and controlling shareholders' bonding on abnormal returns associated with cross-listings. Corroborating the findings of Miller (1999) and Serra (1999), they identify market segmentation to have the greatest explanatory powers with regards to abnormal returns. Doukas and Switzer (2000) investigate the effect of market segmentation along the time dimension by controlling for subsequent shifts in the degree of market integration.[5] Assuming that positive revaluation effects decrease with increase in market integration, they observe price reactions related to the announcement of Canadian companies that simultaneously list their common shares on U.S. stock exchanges. However, since they do not find evidence for increasing market integration during the sample period 1985 through 1996, revaluation effects around the announcement of the secondary listings on a U.S. exchange are significantly positive.[6]

The observations made by Miller (1999), Sundaram and Logue (1996), Serra (1999), Bris et al. (2007), Litvak (2008) and Roosenboom and van Dijk (2009) all highlight the importance of the state of market integration in explaining the abnormal returns around the initial cross-listing. Consequently, it seems reasonable to assume that market segmentation should play a likewise important role in explaining abnormal returns around a cross-delisting decision.

Focusing on price effects around delisting announcements, Hostak et al. (2006) document positive abnormal returns for companies deregistering in the post-SOX period. By explicitly distinguishing between pre- and post-SOX periods, Marosi and Massoud (2008) observe less negative and less significant market reactions in the latter period. Hence, they conclude that the passage of the Sarbanes-Oxley Act has reduced the benefits of a U.S. listing and registration, particularly for smaller firms with lower trading volume and stronger insider control.

Doidge et al. (2008) show that de-registrations are generally associated with adverse stock price reactions, whereas "firms with better growth opportunities and larger financing deficits have significantly worse deregistration-related stock price reactions." You et al. (2012) observe a negative price effect related to cross-delistings, which disappears again in the long run. Studying price reactions around the deregistration process, Fernandes et al. (2010) observe negative market reactions for companies located in countries with low disclosure requirements, as well as for firms from countries with civil law legal origin and with low levels of judicial efficiency. In contrast, stock price reactions are insignificant for firms located in countries with low investor protection.

3.2 Determinants of valuation effects around cross-delistings

As outlined in the previous section, several empirical studies have demonstrated that companies locally listed in emerging markets experience significantly higher positive abnormal returns as a result of their cross-listings on U.K. or U.S. exchanges as compared to firms locally listed in developed markets. It is assumed that this observation can be explained by emerging markets being less accessible for foreign investors and consequently more segmented than developed markets.

Applying this reasoning to cross-delistings, it is hypothesized that, analogous to share price reactions measured around the announcement of the initial cross-listing, abnormal returns observed in the process of a delisting are a function of the

5 To measure the degree of market integration, the authors applied a regime-switching model according to Bekaert and Harvey (1995).

6 Expanding the focus beyond the effects directly associated with the announcement of cross-listing, studies conducted by Alexander et al. (1988), Lau et al. (1994), Serra (1999), Foerster and Karoly (1999), Errunza and Miller (2000) and Sarkissian and Schill (2009) all find a significant decline in returns in the time-period following the listing. This observation supports the initially hypothesized reduction in the cost of capital for companies escaping from segmentation. While Foerster and Karoly (1999) observe an average loss in returns of 14% during the year following the cross-listing, Errunza and Miller (2000) even measure a decline of around 40% in the cost of capital after cross-listing.

accessibility of the firm's local capital market. If investors want to stay invested in a company after it terminates its foreign listing, they need to transfer their investment to the company's local exchange. The easier it is for foreign investors to transfer their investment to the local capital market, the more investors should be willing to do so in order to stay exposed to the company's specific risk-return profile. This leads us to our first hypothesis:

Hypothesis H1: the less accessible a local capital market, the smaller (more negative) the abnormal returns related to the cross-delisting – the maturity of capital markets, as a major part of existing country classification systems, is a second dimension which should influence abnormal returns. Institutional investors often have internal requirements with respect to minimum liquidity thresholds that need to be fulfilled before an investment can be carried out. Thus, market liquidity can be interpreted as an indirect measure of market accessibility given that drops in turnover levels lead to the exclusion of certain investor groups.

Hypothesis H2: the less liquid the local capital market, the smaller (more negative) the abnormal returns related to the cross-delisting – the question of whether a foreign listing is beneficial for a given company also needs to be evaluated in light of the "bonding" and the "loss of competitiveness" hypotheses [Doidge et al. (2008)]. If local markets are already subjected to high regulatory standards, benefits from bonding should not exist, or should at least be less significant. The persisting costs associated with maintaining the foreign listing might therefore even lead to a negative net effect.

Hypothesis H3: the less developed the local market's regulatory environment, the smaller (more negative) the abnormal returns related to the cross-delisting – the share of total liquidity aggregated over all listings of a company that relates to the ADR listing should play a decisive role in explaining abnormal returns given that it serves as a proxy of the cost of capital reduction related to falling country-specific risk premium. Related literature assumes that the information available for a given company is highest in its home market. Focusing on the liquidity allocation between local and foreign dual listings, Halling et al. (2008) hypothesize that the availability of information determines where a given stock is traded. Using the geographical distance between the two exchanges as a proxy for information density, they find liquidity in the foreign cross-listing to be the higher, the closer the place of foreign trade to the local market of the company. Thus, to exploit this information-related advantage, investors should be more inclined to trade locally if both the local and the foreign exchange were similarly easy to access. In contrast, a flourishing foreign market should only emerge if the local exchange is relatively difficult to access. In this case, cross-delisting is likely to lead to an exit of foreign investors.

Hypothesis H4: the higher the fraction of depositary receipts (DR) liquidity, the smaller (more negative) the abnormal returns related to the cross-delisting – the literature typically ignores the fact that companies can have more than one foreign listing, which should have a dampening effect on the share price reaction following a cross-delisting. Take for instance a company locally listed in an emerging market with further foreign listings in developed markets. Terminating the DR program in the U.S. is, for instance, likely to shift liquidity to other developed markets, thereby reducing the magnitude of abnormal returns. What, therefore, matters is the fraction of total liquidity generated in emerging markets, as it reflects the difficulty of accessing a company's stock after the termination of a foreign listing.

Hypothesis H5: the higher the fraction of total liquidity allocated to emerging market listings prior to the cross-delisting, the smaller (more negative) the abnormal returns related to the cross-delisting.

4. Data and methodology

To investigate the hypothesized effects, the study focuses on American Depository Receipts (ADR) formerly cross-listed on U.S. stock exchanges (Level II and Level III DR programs)[7] as common vehicles for cross-listings. As a first step, we searched all active and inactive depository receipts of companies domiciled outside of the U.S. for delisting announcements over a 13-year period from 2000 to 2012. This leads to 457 DR observations, which either still exist or have been delisted in the past. Of those, 124 companies have been excluded as the delisting event was related to an acquisition or a merger event implying a dilution of the

7 Depository Receipts traded in the U.S. can either be traded as Level I, Level II or Level III DRs. While Level I DRs are traded over the counter (OTC), Level II and Level III DRs are listed on the NYSE or the NASDAQ. Level II DRs refer to existing shares locally listed in the cross-listed companies' home market. "New DRs are created from deposits of ordinary shares in the issuer's home market. Level III DRs are public offerings of new shares into the US market." [Depository Receipts – Reference Guide, JPMorgan (11)]

price reaction. Similarly, we discard another 34 companies as the delisting announcement was released together with other information, such as periodic financial results or corporate reorganizations.[8] For 97 delisted companies, no announcements were available, and another eight companies were removed as their delisting coincided with insolvency. Overall, this has led to a sample of 194 delistings with historical price data actually being available for 147 of those companies.

Of the final selection, 121 delistings were purely voluntarily, whereas 26 delistings were a consequence of a violation of listing requirements imposed by the respective foreign exchange. Examples of such violations are the failure to file quarterly financial reports as required by the SEC or not meeting minimum stock price or liquidity requirements. 84 companies of the final sample were cross-listed on the NYSE and 63 on the NASDAQ stock exchange. The sample is geographically well diversified with shares locally listed in 26 different countries, of which 18 countries are classified as developed and eight as emerging markets according to the MSCI country classification standard.

To analyze valuation effects resulting from the termination of cross-listings we use an event-study approach following Lau et al. (1994), Miller (1999), as well as Roosenboom and van Dijk (2009). To assess abnormal returns around the cross-delisting event, the event-study methodology measures the deviation of the true company-specific and event-related return from an expected return undistorted by the specific delisting event. To estimate the expected return, a single-factor market model based on each listing's local market-capitalization-weighted MSCI country index is constructed.[9] Over the course of a pre-announcement date period (estimation period), each company's returns are then regressed against the corresponding country index.[10] The estimation period applied in this study ranges from d_0–1000 days (147 weeks) to d_0–20 days (3.5 weeks). The corresponding event window ranges from d_0–19 days (3.5 weeks) to d_0+12 days (2.5 weeks).[11] The regression coefficients are then used to calculate the expected return for the given stock. Abnormal returns (AR) are determined as: $AR_{id} = r_{id} - (\alpha_i + \beta_i \cdot r_{cd})$ (equation 1), with AR_{id} = abnormal return for security i = 1, ..., N on week (day) d, r_{id} = return of security i on week (day) d, and r_{cd} = return of country c's market index on week (day) d. Various studies found that the announcement day d_0 rather than the initial listing day is the relevant event when it comes to analyzing abnormal returns associated with the initial cross-listing [see, e.g., Kadlec and McConnell, 1994; Miller, 1999; Doukas and Switzer, 2000; Roosenboom and van Dijk, 2009]. It is assumed that the observed price effects associated with the overcoming of market segmentation will be incorporated in the company's share price in the immediate proximity to the initial announcement. When it comes to studying the effect of delistings, the same reasoning should hold.

To test for the statistical significance, abnormal returns are averaged on the event week (day) d_0 over the respective sample of N listings: $\overline{AR_0} = \Sigma_{i=1}^{N} AR_{i0}/N$ (equation 2). As a robustness check, abnormal returns are standardized by dividing each listings abnormal return by its standard deviation determined over the estimation period $S(AR_i)$: $SAR_{id} = AR_{id}/S(AR_i)$ (equation 3). This approach scales abnormal returns by stock price volatility, which serves as a proxy measure for "confidence." Consequently, scaled abnormal returns of stocks that display a high historical volatility are relatively lower compared to scaled abnormal returns of low-volatility stocks. Accordingly, the average standardized abnormal returns are defined as: $\overline{SAR_0} = \Sigma_{i=1}^{N} SAR_{i0}/N$ (equation 4).

8 Note that the simultaneous release of additional information might also affect stock prices and, therefore, does not allow us to properly assess the pure impact of the delisting announcement on prices of cross-listed shares. Excluding these cases is common practice in the related literature.

9 The MSCI country indices applied in the analysis are broad market indices covering 85% of the investable capitalization of the underlying market. Due to the broad market coverage, the event study should not suffer from selection bias.

10 The historical price data on the company level as applied in the analysis is taken from Thomson Reuters Datastream. The time series are adjusted for corporate actions such as stock splits.

11 The analysis focuses on weekly rather than daily abnormal returns as this allows for the measurement of price effects caused by market participants that had relevant information shortly before the official announcement was released (information leakage) or reacted with a short delay. This would, of course, also be captured by cumulative abnormal returns; however, cumulative abnormal returns cover a longer period around the announcement date which decreases their statistical significance due to the cumulating nature of standard errors. To assess the robustness of the model, the analysis is also conducted using daily returns. For the daily model, the estimation period ranges from d_0–500 days to d_0–11 days, whereas the event period ranges from d_0–10 days to d_0+10 days. Next to the models presented in the paper, the analysis was re-run based on a 60-day event period (daily returns) as well as based on a 10-week event period (weekly returns). Furthermore, the length of the estimation period has been varied. The results remained qualitatively the same. To conserve space the results are not shown here, however, they are available from the Supplementary Internet Appendix available at http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx.

To also capture effects that might either come from information leakage prior to the official announcement or from market participants that act over the course of several days enclosing the announcement date, the analysis is extended by taking into account cumulative abnormal returns (CAR). The cumulative abnormal returns are determined based on an aggregation of the average abnormal returns over M weeks (days) of the event window around the announcement date: $\overline{CAR} = \Sigma_{m=1}^{M} AR_m$ (equation 5). To test for statistical significance, the following t-statistic is constructed: [12] $t = \overline{AR_0}/S(\overline{AR_0})$ (equation 6).

Various approaches related to the determination of the standard deviation used to compose the test statistic are discussed in the literature. This paper applies four parametric methods to test the robustness of the results.[13] First, the standard deviation is determined under the assumption of cross-sectional independence. Consequently, each stock's volatility is determined based merely on its own historical observations. To also account for potential cross-sectional dependence among the average residuals, a second model is composed according to Brown and Warner (1985). The standard deviation of this second model is determined based on the average abnormal return across all returns and weeks of the estimation period rather than based on each single stock's historical yield observations. As a third model, the aforementioned standardized abnormal returns are used. As their variance is by definition equal to 1, the standard deviation used to compose the test statistic is given by the inverse of the square root of the number of companies in the sample: $S(\overline{AR_0}) = 1/\sqrt{N}$ (equation 7).

As pointed out by Serra (2002), the null hypothesis of zero abnormal returns is typically rejected too often in case the variance of stock returns increases during the event window. To overcome this problem, Boehmer et al. (1991) proposed to calculate the variance cross-sectionally within the event window rather than for each security over the time of the estimation period, which leads to our fourth model. To assess the hypotheses stated, we first divide the entire sample into two subsamples – companies locally listed in developed and companies locally listed in emerging markets. Abnormal returns are then calculated for each subsample individually. Potential differences between the abnormal returns of the two subsamples as a reaction to the cross-delisting provide a first indication on how market segmentation (H1) maturity (H2) and regulation (H3) of capital markets affect stock price movements as all three dimensions are part of conventional country classification systems. Compared to their developed counterparts, emerging markets are typically less integrated, display lower levels of liquidity and have an inferior regulatory system.[14] While the comparison of abnormal returns based on subsamples provides the basis of an initial qualitative analysis, an Ordinary Least Squares regression model is constructed to explicitly test the above stated hypotheses for the entire sample.

To test the robustness of the regression results, abnormal returns are measured over different time periods surrounding the event date. The first regression model is composed based on cumulative weekly abnormal returns calculated over a 6-week period surrounding the event day, starting 3.5 weeks prior to and ending 2.5 weeks after the event date. A second regression model is based on cumulative abnormal returns over a 4-week period surrounding the event day, starting 3.5 weeks prior to the announcement date and ending with the announcement week. Finally, a third regression model is based on abnormal returns during the event week itself.[15]

We include the following independent variables in the model specifications:

Market integration: capital market integration is measured using three variables. As a first proxy for market integration, the Economist Intelligence Unit (EIU) criterion "access of foreigners to the local capital market" (AC) is applied. Secondly, the ease of capital repatriation (REP) from the Political Risk Services (PRS) Group is included. Capital repatriation should play a decisive role in assessing market access. The harder it is to repatriate

12 Formulas are based on Cowan (1992) and Serra (2002).

13 The Supplementary Internet Appendix available http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx provides a detailed overview of the different ways to determine the different standard deviations for hypothesis testing.

14 Countries are classified according to the MSCI country classification system. MSCI groups countries into three categories: developed, emerging and frontier markets. The allocation is done based on the criteria economic development, size and liquidity requirements, as well as market accessibility. We refer to the MSCI Market Classification Framework available under www.msci.com for a detailed breakdown of the respective criteria.

15 The inclusion of fitted values does not lead to a measurement error problem as the abnormal returns are included as the dependent variable. Consequently, the initial measurement errors are captured by the error term of this regression.

capital, the less willing foreign investors are to allocate money to that market given the uncertainty and difficulty of subsequent capital withdrawal.[16] As third measure for market integration, the correlation (COR) of each country index with the world market (MSCI World index) measured over a three-year period based on weekly returns is used.

Capital market liquidity: capital market liquidity is measured as aggregated traded value scaled by GDP (MVOLL).

Regulatory environment of the local market: The regulatory environment of the local market is assessed using three criteria composed by the EIU. Investment protection (IP) evaluates to what extend property rights are in place in order to guarantee ownership. Insufficient investment protection should deter foreign investors from investing locally. Further, the transparency and fairness of the legal system (TFLS) is included to capture the reliability on the legal frame of a country. Lastly, the state of the financial regulatory system (FRS) is included as a direct measure for the effectiveness of a local investment.[17]

Liquidity allocation: The fraction of DR liquidity (LSDR) is determined as DR turnover divided by the turnover of all listings issued by a given company aggregated over the six months preceding the delisting month. Similarly, the fraction of emerging market liquidity (LSEM) is the ratio of the sum of the turnover of all listings in emerging markets and the total turnover of all listings.

Control variables: A variety of variables controlling for factors that might also influence the price reaction related to the determination of a foreign listing is included in the regression. To control for firm characteristics, total assets (TA), the price-to-book ratio (PTB), returns on assets (RoA), as well as the leverage ratio (LEVR) determined as total liabilities over total assets, are considered. The price-to-book ratio is added to control for growth opportunities. Companies that face more extensive growth opportunities should have a greate need for external financing and should consequently rely more heavily on a broad investor base compared to companies with more limited growth opportunities. RoA is included to control for firm profitability. The termination of a foreign listing announced by a low-performing company can be interpreted as a negative signal concerning the company's present state, and may consequently lead to a negative price reaction if investors decide to reduce their holdings. Similarly, the leverage ratio is included since the delisting announcement of highly indebted companies may send a negative signal about the company's performance prospects to outside investors.

Roosenboom and van Dijk (2009) point out that the information disclosure requirements imposed by the SEC reduce information asymmetries, which might explain positive abnormal returns around the initial cross-listing. Thus, it can be assumed that a negative price reaction is caused by the announcement to terminate the registration with the SEC. To capture this effect, a control variable (SEC) is added, being 1 if the company announces to remain registered and 0 otherwise.[18]

Stock price volatility (STDDEV) measured over a three-year window of weekly returns is included to control for the variability of price movements. Since volatility can be interpreted as a sign of greater uncertainty about a company's financial outlook, the price reaction to a delisting announcement might imply positive or negative deviations from the fair value.[19]

In reference to the competitiveness theory mentioned above, the costs associated with the delisting itself might also play a role in explaining abnormal returns. The introduction of Rule 12h-6 has significantly reduced the expense and time-to-implementation of a delisting. The resulting efficiency gains can be assumed to have a positive influence on abnormal returns. To control for this effect, a dummy variable (R12h-6) is included which equals 1 if the announcement date of the termination is prior to March 2007, the month R12h-6 went into effect, and 0 otherwise.

16 The Political Risk Services Group (PRS) as well as the Economist Intelligence Unit (EIU) offer country risk analytics widely used in academia as well as by political agencies.

17 For the purpose of comparison, the ordinal nature of the EIU variables has to be converted to binary variables, being 1 if the country receives the best possible score within the respective scaling and 0 otherwise.

18 A few companies do not explicitly mention their SEC deregistration in press releases when announcing their delisting. However, they typically refer to high administrative costs associated with the cross-listing as a reason to delist. Other companies are keen to mention that even after delisting, they will keep their SEC registration and accompanied disclosure requirements. Given this intention to signaling, it is assumed that companies that do not explicitly mention keeping their SEC status will terminate their registration.

19 Note that the effect of company-specific over- and under-reactions is partially already controlled for by the event-study model. Companies that tend to overreact relative to the market display a higher beta which generally raises the anticipated "normal" return around the event date and consequently decreases its abnormal return. While the market model only captures systematic risk, stock price volatility relates to a company's total risk.

Hypothesis	Variable	Variable (Abbreviation)	Definition
Dependent variable	Abnormal returns / cumulative abnormal returns	ARi/CARi	Abnormal return of listing i (AR, CAR_-3_1, CAR -3_3)
Market integration (H1)	Access of foreigners to local market	AC_c	Access of foreigners to local market c (dummy variable equal to 1 if the EIU criteria is below 5, and 0 otherwise)
	Repatriation	REP_c	Repatriation of capital from country c (dummy variable equal to 0 if the EU criteria is below 4, and 1 otherwise)
	Correlation	$CORR_c$	Correlation of country c's equity index with MSCI World index (measured over three year moving window of weekly returns)
Maturity of local capital market (H2)	MVOL/GDP (local)	$MVOL_c$	Market turnover of country c divided by GDP
Regulatory environment of local market (H3)	Investment protection	IP_c	Investment protection schemes in country c (dummy variable equal to 0 if the EIU criteria is below 5, and 1 otherwise)
	Transparency and fairness of legal system	$TFLS_c$	Transparency and fairness of legal system (dummy variable equal to 0 if the EIU criteria is below 5, and 1 otherwise)
	Financial regulatory system	FRS_c	Financial regulatory system in country c (dummy variable equal to 0 if the EIU criteria is below 5, and 1 otherwise)
Liquidity allocation (H4/H5)	Liquidity share in ADR	$LSDR_i$	Share of total turnover generated in DR listing
	Liquidity share in emerging / frontier markets	$LSEM_i$	Share of total turnover generated in shares listed on emerging market stock exchanges
Control variables	Total assets	TA_i	Log of total assets of company i
	Price-to-book ratio	PTB_i	Price to book ratio of company i
	Return on assets	ROA_i	Return on assets of company i
	Leverage ratio	$LEVR_i$	Total leverage divided by total assets of company i
	Stdev (σ) (company)	$STDDEV_c$	Volatility of local capital market c (measured over three year moving window of weekly returns)
	Post listing status (termination/OTC)	PL_i	Dummy variable equal to 1 if company i's shares are traded OTC after delisting and 0 otherwise
	SEC-registration	SEC_i	Dummy variable equal to 1 if company i keeps its SEC registration and 0 otherwise
	Exchange (NYSE/NASDAQ)	$EXCH_i$	Dummy variable equal to 1 if company i was listed on the NYSE and 0 otherwise
	Prior to rule 12h6	$R12h6_i$	Dummy variable equal to 1 if the delisting took place prior to Rule12h-6 and 0 otherwise
	Voluntary/involuntary	VOL_i	Dummy variables equal to 1 if the delisting is voluntary and 0 otherwise
	Crisis (dotcom)	CD	Dummy variables controlling for the dotcom crisis equal to 1 during the respective years and 0 otherwise
	Crisis (2007–08 financial)	CF	Dummy variables controlling for the financial crisis equal to 1 during the respective years and 0 otherwise

Table 1: Variables used for hypothesis testing

Focusing on Canadian companies cross-listed in the U.S., Mittoo (1997) observes an exchange-dependent liquidity reaction associated with the initial cross-listing. Given the importance of exchange-dependent characteristics and the fact that our sample contains two foreign exchanges, our model specification contains a dummy variable (EXCH) controlling for potential effects related to the former exchange (NYSE or NASDAQ). Further, a dummy variable (PLS) controlling for the post-listing status of formerly on-exchange listed Depository Receipts (DRs) is included. It is set to 1 if the DR continues to be traded OTC and 0 if it is withdrawn entirely from the U.S. stock market. The continued availability of DRs for OTC trading is expected to reduce the price reaction to the delisting announcement.

Lastly, two binary control variables are included to control for potential distortions associated with bear markets during the 2000–02 dotcom crisis and the 2008–09 financial crisis, i.e., the dummy variables CD and CF being 1 during these crisis periods and 0 otherwise.[20] Table 1 provides a summary of the independent variables and their relationship to the hypotheses stated above.

20 The inclusion of crises-related variables can be considered as an additional control. The concept of abnormal returns as presented above already implicitly controls for crises as it measures the stock price performance relative to a given market index which already captures the price-related effect of crises.

Panel A: Abnormal returns

Week	Model DM_I (AR) (cross-sectional independence)			Model DM_II (AR) (cross-sectional dependence)			Model DM_III (SAR)			Model DM_IV (SAR) (changes in variance)		
	AR	α	*t*-Statistic	AR	α	*t*-Statistic	AR	α	*t*-Statistic	AR	α	*t*-Statistic
-3	0.68%	0.0068	0.9996	0.68%	0.0059	1.1433	7.48%	0.0891	0.8394	7.48%	0.1103	0.6782
-2	1.07%	0.0068	1.5822[c]	1.07%	0.0059	1.8096[b]	13.96%	0.0891	1.5666[c]	13.96%	0.1166	1.1967
-1	-0.49%	0.0068	-0.7313	-0.49%	0.0059	-0.8364	-7.81%	0.0891	-0.8771	-7.81%	0.0698	-1.1188
0	-1.18%	0.0068	-1.7489[b]	-1.18%	0.0059	-2.0002[b]	-16.35%	0.0891	-1.8356[b]	-16.35%	0.1066	-1.5341[c]
1	-2.11%	0.0068	-3.1173[a]	-2.11%	0.0059	-3.5653[a]	-25.14%	0.0894	-2.8110[a]	-25.14%	0.1049	-2.3976[a]
2	0.37%	0.0068	0.5526	0.37%	0.0059	0.6320	-6.93%	0.0894	-0.7749	-6.93%	0.1239	-0.5592

Panel B: Cumulative abnormal returns

Week	Model DM_V (CAR) (cross-sectional independence)			Model DM_VI (CAR) (cross-sectional dependence)			Model DM_VII (SCAR)			Model DM_VIII (SCAR) (changes in variance)		
	CAR	α	*t*-Statistic	CAR	α	*t*-Statistic	CAR	α	*t*-Statistic	CAR	α	*t*-Statistic
-3	0.68%	0.0068	0.9996	0.68%	0.0059	1.1433	6.80%	0.0891	0.7632	6.80%	0.1072	0.6340
-2	1.74%	0.0096	1.8257[b]	1.74%	0.0084	2.0880[b]	14.62%	0.1260	1.1604	14.62%	0.1540	0.9490
-1	1.25%	0.0117	1.0684	1.25%	0.0102	1.2220	7.47%	0.1543	0.4840	7.47%	0.1831	0.4080
0	0.07%	0.0135	0.0509	0.07%	0.0118	0.0582	-1.78%	0.1782	-0.0999	-1.78%	0.2088	-0.0853
1	-2.02%	0.0151	-1.3375[c]	-2.02%	0.0132	-1.5298[c]	-12.58%	0.1992	-0.6313	-12.58%	0.2331	-0.5396
2	-1.65%	0.0165	-0.9972	-1.65%	0.0145	-1.1405	-14.29%	0.2182	-0.6547	-14.29%	0.2551	-0.5600

Table 2: Parametric event study results – developed markets

Accordingly, we specify the following regression model to explain the abnormal returns related to delistings:

$AR_i = \beta_0 + \sum_{j=1}^{3} \beta_j Market\_Integration_c + \beta_k Maturity\_of\_Local\_Capital\_Market_c + \sum_{l=1}^{3} \beta_l Regulator\_Environment\_of\_Local\_Capital\_Market_c + \sum_{m=1}^{2} \beta_m Liquidity\_Allocation_i + \sum_{n=1}^{12} \beta_n Control\_Variables_i + \varepsilon_i$

(equation 8)

5. Empirical results

Tables 2 and 3 summarize the event study results based on weekly abnormal and cumulative abnormal returns of the two samples of companies locally listed in "developed" (Table 2) and in "emerging" markets (Table 3).[21] The statistical significance of abnormal and cumulative abnormal returns has been tested based on the four models previously defined, i.e., under the assumptions of cross-sectional independence and potential cross-sectional dependence, as well as by controlling for standardized abnormal returns and changes in variance related to the event itself.[22]

For the **developed markets** sample, all tests in Panel A of Table 2 indicate statistically significant negative abnormal returns during the announcement week as well as in the week following the announcement. Interestingly, the negative abnormal return

21 The R^2 of the corresponding regression models are slightly higher for the developed market sample (weekly returns: mean = 0.27 and median = 0.27; daily returns: mean = 0.26 and median = 0.23) compared to the emerging market sample (weekly returns: mean = 0.22 and median = 0.22) daily returns: mean = 0.18 and median = 0.15). The results for daily returns are presented in the Supplementary Internet Appendix available at http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx.

22 We control for changes in variance by using cross-sectional volatilities rather than volatilities on a per-stock level along the time dimension when computing the test statistic. The results of the non-parametric generalized sign test and the Corrado rank test are provided in sections B (weekly returns) and D (daily returns) of the Supplementary Internet Appendix available at http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx. Hereby, we again distinguish between companies locally listed in developed markets (Panel A) and those locally listed in emerging markets (Panel B). Two generalized sign tests as well as two Corrado rank tests have been applied. While the first set of tests is based on abnormal returns (Models I and III), the second set uses cumulative abnormal returns (Models II and IV).

during the event week is less significant when taking into account changes in variance related to the event itself (Model IV). This can be interpreted as a first indication of an increase in variance due to the delisting event.

As shown in Panel B of Table 2, only two of the four parametric models show cumulative abnormal returns that are significantly negative in the week following the announcement. When considering changes in variance, no statistically significant results could be observed. This result for the event week can be explained by the positive abnormal returns in the event window prior to the event week. Even though there is a sharp decrease in abnormal returns starting with the event week itself, it takes an additional week to mitigate the effect of the positive abnormal returns in the pre-delisting period when considering cumulative abnormal returns.

Even though the t-statistics of the generalized sign tests provide no significant results,[23] the proportion of negative abnormal returns in a given event week ($\widehat{p}$-values of Model DM_I) increase from 52.38 to 59.2 over the range of six weeks around the delisting event. They reach their peak in the pre-announcement week with a share of 60.32% of negative abnormal returns. Similar results can be found for the respective proportion of cumulative negative abnormal returns (model DM_II). Unlike the generalized sign test, the Corrado (1989) rank test also takes into account the magnitude and not merely the sign of the abnormal returns. It documents statistically significant negative abnormal and cumulative abnormal returns as of the first week following the announcement week (Models DM_III and DM_IV). The fact that the rank test provides significant results, whereas the sign test fails to do so, indicates that the negative abnormal returns observed by the parametric tests are most likely caused by the magnitude of a few negative observations than by a consistent decrease in the stock prices across all stocks in the sample.

The observation of negative abnormal returns based on the developed market sample is surprising, as it was assumed that these companies already have good access to the international capital market via their local exchange. In addition, they should be subjected to reasonably high local disclosure standards that make bonding less significant. Consequently, it could be argued that the cost reduction associated with the cross-delisting should have led to positive abnormal returns. Summing up at this stage of the analysis, it can already be stated that even for companies listed in developed markets, a delisting viewed negatively by the market.

For the **emerging market** sample of Table 3, we find significant negative abnormal returns in the announcement week only in the models for standardized abnormal returns (Models EM_III and EM_IV). However, a graphical representation of the abnormal and cumulative abnormal returns based on the two samples (developed and emerging markets) reveals interesting insights.

Panel A of Figure 1 shows that stocks locally listed in emerging markets experience on average significantly negative abnormal returns two weeks prior to the week of the delisting event. Consequently, their cumulative abnormal returns for the entire event period, as displayed in Panel B of Figure 1, are much lower than the developed market sample. The reason why the cumulative abnormal returns are not consistently significant for the respective samples can be explained by inspecting the development of the t-statistics over time as displayed in Figure 2.

From the graphical representation, it can be concluded that the standardization of abnormal returns tends to generally decrease the statistical significance of cumulative abnormal returns. Taking into account changes in variance related to the event period further increases the standard deviation used to calculate the test statistic, which in turn additionally decreases statistical significance. The fact that the t-values of both samples (developed and emerging markets) at the end of the event period are on comparable levels, even though the cumulative abnormal returns for the emerging market sample are significantly lower, can be explained by much higher volatility levels within the emerging market, as compared to the developed market sample (see standard deviations for cumulative abnormal returns as reported in Tables 2 and 3). Additionally, when testing the significance of cumulative abnormal returns, the standard deviation grows with the square root of time which, ceteris paribus, further decreases statistical significance over time.

23 See Panel A of Section B of the Supplementary Internet Appendix (available at http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx).

Panel A: Abnormal returns

Week	Model EM_I (AR) (cross-sectional independence)			Model EM_II (AR) (cross-sectional dependence)			Model EM_III (SAR)			Model EM_IV (SAR) (changes in variance)		
	AR	α	*t*-Statistic	AR	α	*t*-Statistic	AR	α	*t*-Statistic	AR	α	*t*-Statistic
-3	2.94%	0.0141	2.0838[b]	2.94%	0.0148	1.9868[b]	42.03%	0.2000	2.1015[b]	42.03%	0.3019	1.3920[c]
-2	-4.17%	0.0141	-2.9589[a]	-4.17%	0.0148	-2.8212[a]	-43.60%	0.2000	-2.1800[b]	-43.60%	0.3238	-1.3467[c]
-1	0.16%	0.0141	0.1169	0.16%	0.0148	0.1115	-5.90%	0.2000	-0.2950	-5.90%	0.3070	-0.1922
0	-1.63%	0.0141	-1.1573	-1.63%	0.0148	-1.1034	-29.93%	0.2000	-1.4965[c]	-29.93%	0.2032	-1.4729[c]
1	-1.83%	0.0141	-1.3001[c]	-1.83%	0.0148	-1.2396	-21.52%	0.2000	-1.0760	-21.52%	0.1850	-1.1631
2	0.34%	0.0141	0.2400	0.34%	0.0148	0.2288	6.70%	0.2000	0.3349	6.70%	0.1938	0.3455

Panel B: Cumulative abnormal returns

Week	Model EM_V (CAR) (cross-sectional independence)			Model EM_VI (CAR) (cross-sectional dependence)			Model EM_VII (SCAR)			Model EMVIII (SCAR) (changes in variance)		
	CAR	α	*t*-Statistic	CAR	α	*t*-Statistic	CAR	α	*t*-Statistic	CAR	α	*t*-Statistic
-3	2.94%	0.0141	2.0838[b]	2.94%	0.0148	1.9868[b]	39.39%	0.2000	1.9695[b]	39.39%	0.2799	1.4073[c]
-2	-1.23%	0.0199	-0.6188	-1.23%	0.0209	-0.5900	-2.41%	0.2828	-0.0851	-2.41%	0.3777	-0.0637
-1	-1.07%	0.0244	-0.4377	-1.07%	0.0256	-0.4173	-5.57%	0.3464	-0.1607	-5.57%	0.4619	-0.1205
0	-2.70%	0.0282	-0.9577	-2.70%	0.0296	-0.9131	-19.99%	0.4000	-0.4998	-19.99%	0.5340	-0.3744
1	-4.53%	0.0315	-1.4380[c]	-4.53%	0.0331	-1.3711[c]	-27.51%	0.4472	-0.6151	-27.51%	0.5826	-0.4722
2	-4.19%	0.0345	-1.2148	-4.19%	0.0362	-1.1582	-22.57%	0.4899	-0.4608	-22.57%	0.6324	-0.3570

Table 3: Parametric event study results – emerging markets

This table provides weekly abnormal returns (AR) in Panel A and cumulative abnormal returns (CAR) in Panel B for the emerging market sample, their standard deviations, and t-values for a six week period ranging from d_0-3.5 weeks to d_0+2.5 weeks around the event date d_0. The results on parameter estimates and test statistics are given for the four parametric models as described in the methodology part in section 3. SAR and SCAR stands for the standardized abnormal and cumulative abnormal returns. a, b and c indicate statistical significance at the 1%, 5% and 10% level, respectively. σ stands for standard deviation.

Similar results are found for the analyses based on daily abnormal returns. [24] With the exception of the model that takes into account event-related changes in variance, all models display negative abnormal returns on the announcement day for the developed market sample. Further, significantly negative returns can be observed during the days following the delisting announcement. In line with the analysis based on weekly returns, the models do not consistently reveal significant negative abnormal returns for the emerging market sample. This lack of statistical significance is again primarily due to a much higher standard deviation within the emerging market sample.[25] The results of cumulative abnormal returns and their t-statistics derived from the weekly model match those for the daily model.[26]

As a next step, we analyze the driving factors of stock price movements related to cross-delistings by using the estimated weekly abnormal returns as dependent variables in the regression models of Table 4. In order to test the robustness of the empirical results, the regressions are run with and without the previously defined control variables.[27] To test their robustness, the regressions are repeated based on three different

24 See Sections C and D of the Supplementary Internet Appendix available at http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx.

25 E.g., the standard deviation of the model assuming cross-sectional independence is higher by a factor 2.37 than the standard deviation of the developed market sample S((AR_0)) = 0.0064 (EM) versus S((AR_0)) = 0.0027 (DM).

26 See graphical representations provided in Section C of the Supplementary Internet Appendix available at http://www.sbf.unisg.ch/~/media/Internet/Content/Dateien/InstituteUndCenters/SBF/Mitarbeitende_CV_etc/Effects_from_Cross_Listings_Fuess_Hommel_Plagge_Internet_Appendix.ashx.

27 The following analysis focuses on the extended Models Ib, IIb and IIIb, including control variables. In case the results between both models, parsimonious and extended, significantly deviate, it is explicitly mentioned at the end of the analysis.

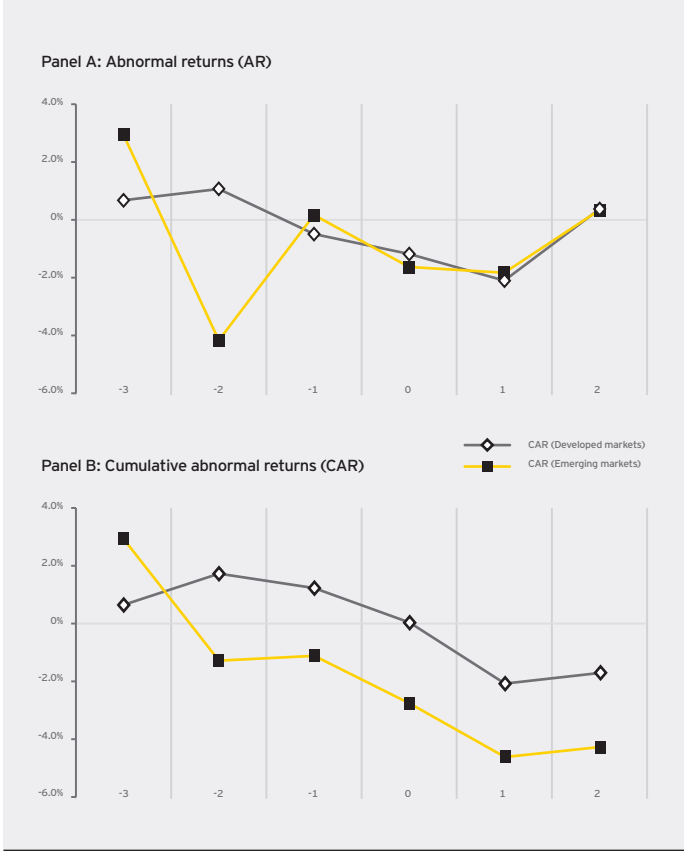

Figure 1: Abnormal returns
Panel A: Abnormal returns (AR)
Panel B: Cumulative abnormal returns (CAR)

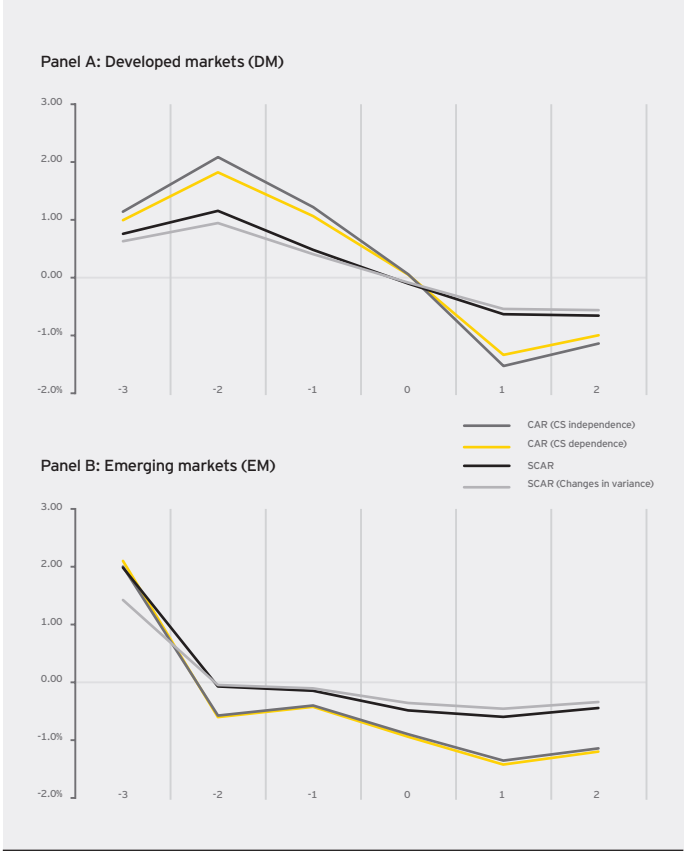

Figure 2: t-statistics
Panel A: Developed markets (DM)
Panel B: Emerging markets (EM)

dependent variables covering different time periods around the announcement date. The first and second columns include the regression coefficients for cumulative abnormal returns based on a six-week period surrounding the event date (Model I). Columns three and four report the results for cumulative abnormal returns based on a four-week period starting 3.5 weeks prior to the event week and ending with the event week (Model II). Finally, the last two columns provide the regression coefficients for abnormal returns measured in the event week itself (Model III).

Table 5 further provides the correlation coefficients of the independent variables. The coefficients range from a minimum of –0.66 between the standard deviation (STDDEV) and the return on assets (RoA) and a maximum of 0.61 between the variables investment protection (IP) and market correlation (CORR).[28]

Market integration: in support of H1, Model III identifies the access of foreigners as a relevant parameter to determine the magnitude of abnormal returns in the announcement week. Abnormal returns for companies domiciled in freely accessible

28 The negative correlation between STDDEV and RoA indicates that highly volatile companies tend to be less profitable. The positive correlation between IP and CORR makes intuitive sense. Integrated countries have higher investment protection as compared to those with underdeveloped property rights. To control for multicollinearity, variance inflation factors have been calculated for each independent variable. However, no factor was found to exceed a value of 4.5, implying that the model should not suffer from multicollinearity issues.

Hypothesis/Control variables	Variable	Model Ia	Model Ib	Model IIa	Model IIb	Model IIIa	Model IIIb
		CAR (d_0–3.5 weeks to d_0+2.5weeks)		CAR (d_0–3.5 weeks to d_0+0.5 weeks)		AR (d_0–0.5 weeks to d_0+0.5 weeks)	
Market integration (H1)	AC_c	3.8153 (3.6062)	1.2330 (3.667)	2.0093 (2.8330)	–1.0787 (2.94949)	3.1221[b] (1.5396)	2.8862[b] (1.4329)
	REP_c	–2.4719 (5.6359)	3.9041 (5.9323)	1.9513 (5.2162)	7.001 (5.5944)	–1.1025 (2.2517)	–1.1682 (2.1138)
	$CORR_c$	–1.1239 (14.1599)	–7.4430 (12.4765)	–2.1659 (12.8676)	–14.25621 (13.12032)	2.6889 (5.8014)	3.9578 (6.0318)
Maturity of local capital market (H2)	$MVOL_c$	0.0022 (0.0170)	0.0042 (0.0129)	0.0017 (0.0128)	0.0012 (0.0101)	0.0068 (0.0047)	0.0072[c] (0.0042)
Regulatory environment of local market (H3)	IP_c	2.21278 (2.84966)	3.8293 (3.7566)	0.0124 (2.8315)	2.42236 (3.22609)	–0.3779 (1.5261)	–1.3329 (1.5238)
	$TFLS_c$	2.75856 (3.00298)	3.5796 (4.2386)	0.6000 (2.2897)	1.2361 (3.1524)	–2.9392[c] (1.7057)	–2.7477[c] (1.5042)
	FRS_c	–12.06863[b] (5.3882)	–12.7649[c] (6.7380)	–10.0755[c] (5.1332)	–7.8159 (5.7260)	–3.9233 (4.8075)	–3.4126 (4.7974)
Liquidity allocation (H4/H5)	$LSDR_i$	–31.7739[a] (8.6835)	–32.5847[a] (8.4197)	–16.7230[c] (9.1046)	–22.1177[b] (10.03282)	–10.1328 (6.1430)	–13.3599[a] (3.8844)
	$LSEM_i$	2.9394 (8.300)	6.9182 (8.2184)	–0.0839 (8.2538)	2.7239 (7.6541)	0.4194 (1.8440)	–0.5786 (2.3579)
Control variables	$ln(TA)_i$		0.0515 (0.8409)		0.1141 (0.7008)		0.0789 (0.3579)
	PTB_i		–0.3511 (0.3427)		–0.2856 (0.3119)		–0.0381 (0.1194)
	ROA_i		–0.2630[b] (0.1124)		–0.1540 (0.1061)		0.1561 (0.1075)
	$LEVR_i$		–3.2346 (6.4818)		–8.8130[c] (4.6203)		–2.1859 (3.8988)
	$STDDEV_i$		–50.0101 (40.7723)		11.9929 (29.9235)		56.3752[a] (21.6338)
	PL_i		–4.4880 (4.7983)		–3.6607 (4.5293)		–2.5280 (2.6288)
	SEC_i		–10.3245[b] (4.6769)		–6.6407[c] (3.7136)		–1.9796 (1.6861)
	$EXCH_i$		–1.1690 (3.3642)		–0.8679 (3.3182)		–1.6403 (1.7609)
	$R12h6_i$		1.1739 (5.2036)		4.9209 (5.0282)		–0.1013 (2.6507)
	VOL_i		–0.9043 (4.1453)		4.1281 (4.2425)		4.9275[c] (2.6350)
	CD		2.2125 (5.4733)		2.3342 (5.3837)		–1.5205 (3.5918)
	CF		9.5762 (9.3416)		7.3294 (6.8419)		1.1413 (1.9831)
	Constant	–0.7902 (8.7782)	–2.9494 (18.1522)	–0.4672 (8.4841)	–1.9102 (14.9795)	–2.8425 (4.0480)	–8.9700 (5.9503)
	Adjusted R^2	0.1164	0.2020	0.0723	0.1867	0.1031	0.237

Table 4: Regression results

This table provides the regression coefficients and robust standard errors for equation (8) based on the core models (i.e., without control variables) as well as the full specification (i.e., including controls). Models Ia and Ib include the results of the regression based on cumulative abnormal returns (CAR) for a six-week period ranging from d_0–3.5 weeks to d_0+2.5 weeks, Models IIa and IIb display the regression results for cumulative abnormal returns (CAR) ranging from d_0–3.5 weeks to d_0+0.5 weeks, and Models IIIa and IIIb provides the regression results for abnormal return (AR) in the event week (d_0–0.5 weeks to d_0+0.5 weeks). All values are multiplied by 100 for better reading. a, b and c indicate statistical significance at the 1%, 5% and 10% level, respectively.

	AC	REP	CORR	MVOL	IP	TFLS	FRS	LSEM	LSDR	ln (TA)	PTB	ROA	LEVR	STDDEV	SEC	PL	EXCH	R12h6	VOL	CD	CF
AC	1																				
REP	0.42	1																			
CORR	0.33	0.50	1																		
MVOL	0.32	0.34	0.23	1																	
IP	0.52	0.51	0.61	0.17	1																
TFLS	0.42	0.34	0.37	0.22	0.48	1															
FRS	0.30	0.07	0.08	-0.08	0.24	0.30	1														
LSEM	-0.28	-0.53	-0.26	-0.23	-0.32	-0.38	-0.15	1													
LSDR	0.07	-0.22	-0.31	0.07	-0.17	-0.14	-0.05	0.07	1												
ln(TA)	-0.01	0.29	0.29	0.09	0.12	-0.07	-0.16	-0.09	-0.34	1											
PTB	-0.06	-0.05	-0.05	-0.02	-0.07	-0.08	-0.19	0.03	0.05	0.02	1										
ROA	-0.11	0.05	0.07	0.17	-0.05	-0.11	-0.32	0.07	-0.16	0.49	-0.05	1									
LEVR	0.08	0.10	0.23	0.10	0.12	0.04	0.02	-0.13	-0.11	0.44	-0.07	0.17	1								
STDDEV	0.06	-0.09	-0.16	-0.19	-0.04	0.01	0.24	0.02	0.42	-0.43	0.01	-0.66	-0.19	1							
SEC	-0.13	0.07	0.07	-0.04	0.09	0.13	-0.11	-0.09	-0.11	0.04	0.02	0.08	-0.09	-0.08	1						
PL	0.08	0.22	0.27	0.23	0.07	-0.04	-0.30	0.01	-0.00	0.15	0.15	0.03	0.18	0.02	0.13	1					
EXCH	0.15	-0.06	0.15	0.12	0.03	-0.12	-0.11	0.09	-0.06	0.47	-0.08	0.30	0.27	-0.31	0.20	0.01	1				
R12h6	0.12	0.16	0.35	0.38	-0.04	-0.09	-0.45	0.02	-0.07	0.35	0.09	0.34	0.16	-0.35	0.12	0.58	0.34	1			
VOL	0.14	0.20	0.24	0.15	0.14	0.17	-0.14	-0.13	-0.24	0.19	-0.04	0.30	-0.11	-0.41	0.01	-0.12	0.15	0.26	1		
CD	-0.03	-0.18	-0.23	-0.23	0.02	0.02	0.15	-0.05	0.10	-0.31	0.03	-0.35	-0.15	0.40	0.05	-0.02	-0.25	-0.46	-0.30	1	
CF	-0.01	-0.06	0.07	-0.03	-0.16	-0.16	-0.17	0.20	0.16	-0.09	0.04	-0.01	-0.15	-0.01	-0.08	0.21	0.05	0.37	-0.00	-0.17	1

Table 5: Correlation matrix of independent regression variables
Correlation coefficients of all explanatory variables used in the regression as defined in equation (8). The coefficients of binary variables are calculated according to Spearman rank correlation coefficient.

countries are on average 2.89 percentage points higher than for those listed in countries difficult to access by foreign investors. It is reflective of the fact that the return to a segmented or semi-integrated market leads to a cost of capital increase. The variables correlation (CORR) and capital repatriation (REP) do not exert a significant influence on abnormal returns. Similarly, the market integration proxies are not found to affect cumulative abnormal returns (Models I and II). The lack of significance might be explained by a distortion of cumulative abnormal returns resulting from price reactions prior to the delisting week as observed in Figure 2 in the context of the previous discussion.

Capital market liquidity: the trading volume scaled by GDP, as a proxy for the maturity of the local capital market, is found to positively influence abnormal stock price movements in the delisting week. An increase in the aggregated turnover of the local market by one standard deviation increases the abnormal return by 0.99 percentage points. As hypothesized in H2, companies that are locally listed in mature capital markets suffer less from a foreign delisting. Again, the variables' influence on cumulative abnormal returns (Models I and II) is insignificant.

Regulatory environment of the local market: among the variables used as proxies for the regulatory environment, only the transparency and fairness of the legal system (TFLS in Model III) and the financial regulatory system (FRS in Model II) show a statistically significant influence on abnormal returns around the delisting announcement. Interestingly, their influence contradicts H3. Companies locally listed in countries that have a more transparent and fairer legal system (better financial regulatory system), on average, experience lower abnormal returns than those locally listed in markets with a lower TFLS (FRS) score. One explanation for this negative relationship might be that companies resident in markets with high regulatory standards experience lower delisting-related savings as they need to maintain high standards of disclosure requirements.

Liquidity allocation: in support of H4, the share of total liquidity generated in the DR is found to have a significant and negative influence on abnormal and cumulative abnormal stock price movements. This observation is consistent across all three models. An increase in the share of DR liquidity by one standard deviation (18.09%) decreases abnormal returns by 2.42 percentage points and cumulative abnormal returns by as much as 5.90 percentage points (e.g., as measured in Model I). Thus, a higher relative DR liquidity, as an indicator for the importance of a foreign investor base of a given company, leads to lower abnormal returns. As a consequence of the foreign delisting, such companies suffer from higher negative abnormal returns after returning to their local investor base. Other than assumed in H5, the fraction of total liquidity generated in emerging markets prior to the delisting is not found to have a significant influence on delisting-related stock price movements. The results rather indicate that, after controlling for the accessibility of the local capital market, the liquidity attached to the DR listing itself is of value irrespective of the overall liquidity spread between developed and emerging market places.

Control variables: among the control variables included in the model only a few are found to be significant. As expected, the leverage ratio is negatively related to abnormal returns (Models II). An increase in the companies' indebtedness of one standard deviation (26.04%) leads to a decrease in cumulative abnormal returns of 2.30 percentage points (Model II). Thus, the market negatively values the delisting attempt for companies that are relatively more indebted. In case of highly indebted companies, a foreign delisting might even signal financial distress to outside investors, which in turn leads to relatively higher negative abnormal returns. However, this conjecture is only supported by the second model, whereas the influence of leverage is not significant in Models I and III.

Companies' total risk, as measured by their stock price volatility, is found to exert a positive influence on abnormal stock price movements (Model III). This observation is in line with the initial assumption indicating that the amplitudes caused by a delisting announcement might be more pronounced for highly volatile stocks. RoA influences cumulative abnormal returns (Model I) negatively. Thus, the more profitable a company is, the less positive is the market's reaction to the delisting announcement. In light of the loss of competitiveness argument stated above, this observation makes intuitive sense. The decrease in administrative costs associated with a delisting is likely to relax financing constraints for less profitable companies. In addition, companies announcing that they intend to maintain their SEC registration experience lower abnormal returns than to those choosing to deregister. In the face of the competitiveness argument, this indicates that the market values cost savings more favorably than the continuation of the SEC registration. Lastly, companies that voluntarily delist show less negative abnormal returns than those that involuntarily delist. A self-controlled action, presumably taken after a careful evaluation of associated risks, should be more positively valued by investors than a delisting enforced by a third party.[29]

6. Conclusion

The event study results show that the market reaction to a delisting announcement is, on average, negative across all companies. Over the course of the different specifications of event periods, the negative price reactions are even found to accumulate. On the event date itself, this reaction is statistically significant for the developed market sample. However, for the emerging market sample, it is not found to be consistently significant across all statistical tests applied, even though the cumulative abnormal returns are more negative compared to the developed market sample. This missing significance can mainly be attributed to the significantly higher volatility of abnormal returns within the emerging market sample, which leads to biased test statistics when not adjusted for increasing variance during the event window.

The observation of consistent negative abnormal returns related to the announcement of cross-delistings shows that a foreign listing is generally viewed positively by market participants. This evaluation even holds for companies that are locally listed on already well-integrated stock exchanges. However, companies locally listed in emerging markets suffer, on average, higher negative abnormal returns. This empirical observation is

29 The parsimonious model underscores the significance of investors' access to the local market (AF) when evaluating abnormal returns (Model III). The magnitude of its influence even increases compared to the extended model. The negative influence of FRS and TFLS on abnormal and cumulative abnormal returns is supported as well. Lastly, the comparison of the two models underscores the significance of the share of total liquidity concentrated in the DR prior to the delisting announcement. The higher the share of DR liquidity (LSDR), the more negative is the observed price reaction.

consistent with the hypothesis that companies which cannot rely on an international investor base but are mainly restricted to local investors are faced with higher refinancing costs. Local investors of segmented or semi-integrated markets cannot diversify away the local country's specific risk entirely and consequently require a premium for carrying additional risk. Thus, companies that return to segmented or semi-integrated local capital markets experience a relatively higher devaluation of their stocks in anticipation of higher refinancing costs in the future.

These results are further supported by the regression analysis to explain abnormal returns. The ease of access to a given market is found to exert a positive influence on abnormal returns associated with the delisting announcement. Furthermore, the share of total liquidity allocated to the foreign listing is negatively related to abnormal performance. If a company withdraws its cross-listing that generates a high portion of its liquidity in a foreign listing, it loses an essential access route to a given market, and that is viewed negatively by its investors.

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