Multi-Market Trading and Cross-Asset Integration*

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Abstract

We study how trading in multiple markets affects the integration of a firm's capital structure. Using daily data on cross-listed securities and credit default swaps (CDS) traded around the world, we find that foreign listing improves the synchronicity between firm stock and CDS returns. This effect is robust to the inclusion of market and firm-level controls, and it manifests itself most profoundly among larger, more liquid, better credit quality firms, as well as among firms with higher analyst coverage. Integration tests reveal that, after foreign listing, firm-specific credit risk becomes more exposed to both world and local equity market risks, with a larger change in the world market beta. Our results suggest that cross-listings have an important impact on debt and equity market integration, and that this integration is more easily attained for securities of more visible firms.

JEL Classification: G12; G13; G14; G15

Keywords: Familiarity; Investor recognition; Return co-movement; Risk premium

1. Introduction

In informationally efficient and integrated capital markets, changes in prices of different asset classes, such as equities and bonds, as well as their derivatives, must be largely synchronous (Merton 1974). However, the growing literature overwhelmingly finds that the co-movement between a firm's stock returns, on the one side, and returns on its bonds or credit default swap (CDS) spreads, on the other, is weak (see Collin-Dufresne, Goldstein, and Martin, 2001; Blanco, Brennan, and Marsh, 2005; Kapadia and Pu, 2012; Johnson and Lee, 2014; Choi and Kim, 2015). The primary explanation for this phenomenon is costly arbitrage attributed to various aspects of asset illiquidity and volatility.[1] Yet, according to the Merton's (1987) investor recognition hypothesis, if investors have limited information about a firm, then its securities carry extra risk premia, and, therefore, they cannot be fully integrated in financial markets. Similarly, Duffie (2010) shows that investor inattention may distort asset price dynamics. This alternative reason for a lack of cross-asset integration has been largely unexplored.

In this paper, we examine how asset visibility affects the co-movement between equity and debt markets. The co-movement across asset classes impacts the investment opportunity set and, consequently, the international diversification benefits of investment funds and capital structure arbitrageurs. Understanding these capital structure dynamics is especially relevant in light of a multi-trillion dollar investment industry that keeps growing. Since both equity and debt are traded in international markets, it is imperative to account for changes in informativeness of a firm's securities from the point of view of a global investor. Investor recognition and attention may impact security price dynamics since news affects the buying behavior of individual and institutional investors, as shown in Barber and Odean (2008). Baker and Wurgler (2012) suggest that the lack of integration between stock and bond markets is related to investor sentiment.

[1] Kapadia and Pu (2012) argue that cross-asset price discrepancies are linked to the illiquidity of assets and idiosyncratic risk. Johnson and Lee (2014) show that systematic variation in residual earning dispersion may account for a large fraction of discrepancies between debt and equity prices. Choi and Kim (2015) show that asset segmentation correlates with noisy investor demand and short-sale constraints. Leone and Stojkovic (2015) find that cross-asset disintegration is related to funding constraints and limited hedging.

Therefore, the more a firm is known worldwide, the more likely it is that its securities spanning various asset classes will receive more equal attention, especially on the part of institutional investors and arbitrageurs. As a result, one should anticipate higher cross-asset integration for better known firms.

To accomplish our goal, we study how trading on multiple foreign stock exchanges affects the integration between equity and debt (CDS) markets. Numerous studies highlight viable visibility and investor recognition benefits for firms that cross-list their shares in foreign markets (see Foerster and Karolyi, 1999; Baker, Nofsinger, and Weaver; 2002; Lang, Lins, and Miller, 2003; Ahearne, Griever, and Warnock, 2004; Chambers, Sarkissian, and Schill, 2014). Once investors' familiarity with a specific firm is increased in equity markets, it should translate into increased familiarity with the same firm in debt and derivative markets as well.[2] Spillover effects from the CDS to the equity market are possible too, but the evidence for this channel is generally weak.[3] Therefore, a firm's decision to cross-list on a foreign exchange, being exogenous to the trading activity in global capital markets, provides a quasi-natural and unique setting for studying the impact of investor recognition on return co-movement of the firm's capital structure.

We use equity cross-listings data issued between 2001 and 2011 with daily CDS and equity return data extending up to the end of 2013. We identify 241 cross-listing events made by 215 firms, spanning 40 home countries and 28 host countries. As some firms have multiple CDS contracts traded on different subsidiaries, we have in total 278 CDS-stock pairs. We proxy the return on a company's debt securities using CDS data, as they allow for an apple-to-apple comparison across countries and firms, given that they are not contaminated by differences in covenants or legal differences in contracts. Consistent with Merton (1987) we find significant

[2] The knowledge about the firm may increase not only in financial markets, but also in product markets (e.g., Foucault and Gehrig, 2008; Pagano, Roell, and Zechner, 2002).

[3] Acharya and Johnson (2007) emphasize information flows from CDS to stock returns. However, using a longer data sample, Hilscher, Pollet, and Wilson (2015) do not find that CDS returns are able to predict or contemporaneously affect stock returns. Similar results between stock and bond returns are documented by Kwan (1996). Moreover, Boehmer, Chava, and Tookes (2015) argue that the introduction of CDS itself negatively affects the efficiency of the equity market.

time-series and cross-sectional differences in cross-asset integration depending on changes in firm informativeness over time and on various firm characteristics. In particular, we show that foreign listings improve the alignment between firms' stock and CDS returns. The average absolute correlation between the two series increases almost 70% within one year after the cross-listing relative to the pre-listing period. This result is not only robust to the inclusion of market and firm-level control variables, as well as firm fixed effects, which account for unobserved firm characteristics, but also becomes even stronger in full panel regressions. In these estimations, a one percent decrease in the stock return of a firm listed only in its domestic market increases the contemporaneous CDS return by an average of 5%. However, after the firm places its shares also on a foreign exchange, a similar impact on its CDS return increases to about 20% on average. Using a matched control sample of non-cross-listed firms and the difference-in-differences methodology, we confirm a very unique role of foreign listings in improving the integration between equity and debt markets. The importance of cross-listing as a vehicle for increasing integration between stock and CDS markets is particularly profound in the post-2007 period.

Next, in the cross-section, we show that the increase in co-movement between a firm's stock and CDS returns is substantially stronger for firms with larger market capitalization, better credit quality, higher CDS liquidity, as well as for firms with larger analyst coverage. We emphasize that improvement in investor recognition and asset integration is firm-specific. The differences in the strength of the co-movement between stock and CDS returns among firms with cross-listings is driven only by firm characteristics, and not by those of firms' domicile markets or global macroeconomic and financial risk factors. However, cross-country familiarity and closeness are also significant factors affecting the co-movement between firm equity and debt. We also find that, similar to the strong improvement in integration between contemporaneous changes in stock prices and CDS spreads, the impact of lagged stock returns on CDS returns is also significant in the overall sample, although several times smaller in value. This relation is again much more important economically and statistically for larger, better quality, or more liquid firms, and for those firms that are covered more widely by financial analysts.

To confirm our results using an alternative measure, we apply the Kapadia and Pu (2012) test on pricing discrepancy between firm stock prices and CDS spreads before and after cross-listing. We show that the arbitrage opportunities between the two markets significantly decrease with the placement of a firm's shares overseas. Comparing the change in the capital structure integration measure between the cross-listed firms and a sample of matched firms without cross-listings, we find an increase of integration of 50%. These findings cannot be explained by a change in liquidity in either the stock or the CDS market after the listing of shares abroad.

Finally, we investigate the direction and magnitude of changes in the sensitivities of CDS returns to the world and local equity market risks that result from cross-listing. We find that the magnitudes of both the world and local market betas of CDS contracts increase after cross-listing: from 0.46 to 0.73 for the world market beta and from 0.20 to 0.36 for the local market beta, based on a two-factor market integration model. A larger change in the world market beta indicates that foreign listings, by improving the co-movement between firm CDS and stock returns, lead to a significant increase in integration of CDS with the world equity market.

Our contribution to the literature is three-fold. First, we contribute to the literature on capital structure integration and the relation between stocks and CDS by using a quasi-natural experiment that allows identifying a precise channel, i.e., limited investor recognition and attention that prevents perfect integration. Hilscher, Pollet, and Wilson (2015) analyze the relation between the co-movement of stock and CDS returns and investor attention, but they focus on transitory changes in investor attention resulting from earnings announcements in only one market.[4] Kapadia and Pu (2012) explain the lack of cross-asset integration by liquidity and idiosyncratic risk, but their study is unconditional and again restricted to the U.S. market. Moreover, by showing that trading in multiple markets increases cross-asset integration, we also relate to studies that examine the impact of CDS trading on the corresponding bond and equity

[4] Other studies on the interaction between stock and bond or CDS returns include Gebhardt, Hvidkjaer, and Swaminathan (2005), Norden and Weber (2009), and Bao and Hou (2014).

markets.[5] Second, we extend the literature on the determinants of credit default swaps by showing that, as internationally traded securities, the time-series properties of their returns can be significantly influenced by corporate financial decisions of firms that are unrelated to their debt price dynamics, but yet associated with their global visibility. Lee, Naranjo and Sirmans (2015) consider foreign listings on exchanges with stricter disclosure requirements as one of the determinants of lower co-movement between corporate and sovereign CDS spreads, but they do not examine cross-asset integration at the firm level. In sum, our findings show that cross-listings play an important role in increasing the debt and equity market integration, and that this integration enhancement is stronger for securities of more reputable and familiar firms.[6] Finally, we add to the cross-listing studies by showing that a cross-listing based on one asset class (equity) has strong implications on the return dynamics of not only that asset class, as documented earlier (e.g., Foerster and Karolyi, 1999; Sarkissian and Schill, 2009), but that it also induces spillovers to the return dynamics of other asset classes (debt and its derivatives).

The rest of the paper is organized as follows. Section 2 describes the cross-listing and CDS data and presents the summary statistics. Section 3 shows the main estimation results on the co-movement between CDS and stock returns before and after cross-listing. Section 4 offers a direct pricing discrepancy test between stock prices and CDS spreads. Section 5 focuses on world market integration tests for firms' equities and CDS contracts. Section 6 provides numerous robustness tests. Section 7 concludes.

2. Data and Summary Statistics

[5] While Das, Kalimipalli, and Nayak (2014) show that CDS trading reduces bond market efficiency, Massa and Zhang (2012) argue that bond liquidity is introduced as the insurance availability reduces fire sale risk in the face of liquidation pressures. Finally, Boehmer, Chava, and Tookes (2014) show that CDS trading, on average, reduces equity market liquidity and efficiency.

[6] More tangentially, our paper is also related to the literature on capital structure arbitrage (e.g., Duarte, Longstaff, and Yu, 2007; Yu, 2006) and on common risk factors in credit and equity markets (e.g., Keim and Stambaugh, 1986; Shiller and Beltratti, 1992; Fama and French, 1993; Campbell and Ammer, 1993; Collin-Dufresne et al., 2001; Schaefer and Strebulaev, 2009; Han and Zhou, 2013; Friewald, Wagner, and Zechner, 2014).

Our sample covers a period between 2001 and 2013 and consists of 241 cross-listings of firms for which we are able to identify valid stock and CDS price information up to two years after the cross-listing event. We first discuss the cross-listing data, then the CDS and stock price information, as well as other data sources that we use in our analysis.

2.1. Cross-Listing Data

Our cross-listing sample covers the period from 2001 to 2011 inclusive.[7] It comes from several sources. Most of the information is from the Sarkissian and Schill public database that provides the geography of foreign listings until 2006.[8] We further supplement this information with cross-listings data obtained directly from stock exchanges around the world, as well as the CRSP database for foreign listings in the United States. We retain only those cross-listings for which we can identify valid CDS price information. This procedure yields 241 cross-listing events across 40 home markets and 28 host markets, representing 215 unique firms with traded CDS contracts. Out of the total number of firms with cross-listings, 190 undertake only one listing in a foreign market during our sample period, 24 – in two, and one firm is cross-listed on three overseas exchanges.

Table 1 shows the frequency distribution of cross-listings. Panel A gives the distribution of foreign listings across countries. As expected, the largest number of firms with both cross-listings and CDS is in the United States (86), Luxembourg (38), and the United Kingdom (21). The largest supply of cross-listings comes from firms from France (24), followed by firms from the United Kingdom (23), India (20) and the United States (20). Twelve countries in our sample have only one foreign listing. The pairs of countries with the largest number of cross-listings are the United States for firms from the United Kingdom and Canada (15 and 14, respectively) as well Luxembourg for Indian firms (14).

[7] Our cross-listing sample is shorter by two years than the overall sample of our analysis, as we require a minimum of two years of stock and CDS return information after the cross-listing to examine its impact on the co-movement of CDS and stock returns.
[8] See http://sergei-sarkissian.com/data.html.

In Panel B of Table 1, we show the distribution of cross-listings across home countries and nine sectors based on the one-digit SIC codes. These industries are mining and construction (MNG); manufacturing (MFC); transportation (TSP); wholesale and retail trade (TRD); finance, insurance and real estate (FIN); services (SVS); and public administration (ADM). Manufacturing firms provide the largest contribution to our sample (89) followed by financials (67). Two countries, India and the United Kingdom, provide the largest number of cross-listings in manufacturing and financial sectors, 12 and 11, respectively. On the other hand, the lowest number of cross-listings is recorded for firms in the trade and public administration sectors, six and three, respectively.

Panel C of Table 1 shows the distribution of foreign listings across home countries by calendar year. We note that more than 80% of all cross-listings in our sample occurred prior to 2008. This is not surprising as foreign listings are usually placed in more favorable economic conditions (Sarkissian and Schill, 2014), and the whole time period from 2008 is marked by the financial crisis and a fairly unimpressive global economic recovery. In the midst of the crisis, in 2008, there were only nine foreign listing placements, out of which four went to emerging markets in Latin America and Qatar.

2.2 CDS and Stock Return Data

We source the CDS data from Markit, a leading data provider of information on single name CDS. The starting date of our sample is dictated by the availability of CDS data. Starting from 2001, Markit provides daily CDS spread quotes for over 3,000 firms worldwide using a network of market makers from large partner banks. Similar to other authors (e.g., Kapadia and Pu, 2012; Hilscher, Pollet, and Wilson, 2015), we use daily USD denominated five-year CDS contracts written on senior debt, since they are the most widely traded and liquid. We choose contracts with the modified restructuring (MR) clause, as this was the default contract by convention in the United States that represents the largest proportion of firms in our sample, up

to the implementation of the Big Bang Protocol in 2009.[9] Markit also reports the quoting counts of unique market makers that are used in the computation of the mid-market spread for each CDS contract. With no information on the trading volume of CDS contracts, the number of quote providers serves as a CDS coverage or liquidity proxy (Qiu and Yu, 2012). We manually match our cross-listing sample with CDS data, requiring that each cross-listed firm has an underlying CDS contract available. Out of the 215 firms in our sample, 186 have a single underlying CDS contract, while 29 have multiple traded contracts written on different subsidiaries. Hence, we obtain a total of 278 firm-specific stock-CDS pairs that are the focus of our analysis, spanning from January 2001 until December 2013. Our sample includes more than 300,000 daily CDS return observations.

We proxy the return on a company's debt over a risk-free benchmark with the CDS spread, as it is less contaminated by covenants and contractual differences, improving a direct comparison in cross-country studies.[10] The CDS contract offers an insurance protection against adverse changes in the credit quality of the underlying bond or any other security issued by a firm sensitive to credit rating. Therefore, a deterioration of a firm's credit quality yields a positive return to the *buyer* of the insurance. The return on the CDS contract at date t is computed as the change in the natural logarithm of the price of the CDS contract between dates t-1 and t, which is a robust approximation to the true CDS return (see Hilscher, Pollet, and Wilson, 2015).

Lastly, we manually match the sample of cross-listed firms with Datastream, I/B/E/S and Compustat Global to obtain the daily USD denominated equity returns, analyst coverage, and annual financial fundamentals, respectively, over the same 2001-2013 period. The match is conducted manually based on the firm's name, country of origin, industry belonging, and other

[9] After the implementation of the Big Bang Protocol, the conventional CDS contract in the United States specifies no restructuring. In Europe, the contract by convention specifies modified restructuring. Importantly, we need to examine a sample of equivalent contracts in order to avoid that our results are driven by cross-sectional differences in restructuring credit event clauses (Berndt, Jarrow, and Kang, 2007).

[10] In frictionless markets, the CDS spread is equivalent to the spread of the bond over a risk-free benchmark (Duffie, 1999), although frictions may, at times, disrupt this arbitrage relation (Mitchell and Pulvino 2012; Bai and Collin-Dufresne, 2013; and references therein).

public information from the company's website. For firms that are listed in multiple markets, we obtain the equity return information in all relevant markets. Yet, we only obtain the analyst coverage and financial fundamentals from the home country determined by the firm's headquarter location. The analyst coverage is the total number of unique analysts providing earnings forecasts (EPS) for a firm during the twelve-month period before the fiscal year end from I/B/E/S.[11] We remove all firms from our sample identified as de-listed by Datastream. We complement our data with several global macroeconomic and financial control variables from the Federal Reserve Bank of St. Louis, such as the CBOE options implied volatility index, the daily change in the default spread, which is the difference in yields between BAA and AAA corporate bonds, and the daily change in the U.S. term spread, which is the difference in yields between ten-year T-bonds and three-month T-bills.

Table 2 presents the timing of a firm's CDS trading initiation in relation to the placement of a firm's cross-listing. We split the sample into three sub-periods: three months prior to the cross-listing date, three months after the cross-listing date, and six months around the cross-listing event. We can see that the number of CDS initiations occurring before and after cross-listing is about the same (129 and 123). This ensures that there is sufficient data for the analysis of the impact of cross-listings on the co-movement of stock and CDS returns over the time relative to the foreign listing event. In 26 cases (about 10% of the overall sample) the CDS issuance occurs effectively at the same time as the firm's placement of cross-listing. Among all countries, firms from the United Kingdom, France, and the United States provide the largest number of CDS contracts, 30, 29, and 24, respectively.

Table 3 shows the means and standard deviations of firm CDS data, equity returns, and other firm characteristics for each home country of cross-listings. The sample period runs from January 2001 until 2013. Panel A present these statistics for the CDS spread (in percent) and

[11] Given different accounting standards across countries, the financial fundamentals from Compustat Global are retrieved with the following filters. All accounting numbers are denominated in USD. If multiple accounting standards exist, we choose the report by descending order of preference: IFRS, GAAP, and the domestic standard.

depth, as well as for CDS returns and stock returns. It also reports the number of observations per country based on the minimum available CDS data, the correlation between CDS and stock returns, and the proportion of stale quotes among CDS contracts with five-year maturity. The largest number of CDS and stock return observations is for France and the United Kingdom, the lowest for Colombia. There is large cross-country variation in the average CDS spreads, depths, and returns. The CDS spread is the highest for a firm from Kazakhstan, more than 21%, while the lowest, surprisingly, is in Greece, only 34 basis points (bps). The mean spread of firms listed in the United States is 186 bps, higher than the sample average of 164 bps. Iceland posts the highest mean CDS coverage in excess of ten, indicating a larger pool of market makers for its two CDS contracts traded in global markets. The average return on CDS contract is positive in our sample (10 bps per day), but in 14 out of 40 countries it is negative. The largest CDS return is observed for a firm from Colombia, followed by that from Liechtenstein; the lowest for firms from Mexico. The average daily equity return across all countries in our sample is also positive (5 bps), but many countries post negative values. However, the incidences of positive and negative average stock returns across individual countries do not coincide with those for CDS returns. The largest average daily stock return is recorded for a firm from the United Arab Emirates (hereafter Arab Emirates) cross-listed in the United Kingdom, while the lowest is for the Colombian firm cross-listed in the United States. The second to the last column shows the correlation coefficient between stock and CDS returns. As expected, this correlation is negative for all countries with the exception of Kazakhstan. However, on average it is only negative 0.14 reflecting low synchronicity between equity and CDS markets. Finally, the proportion of stale quotes is the lowest (zero) for firms from the Arab Emirates and Colombia, while it is the highest for a Ukrainian firm (almost 67%). The average stale quotes for firms from the United Kingdom and the United States is close to the sample average of 17%.

Panel B of Table 3 provides the means and standard deviations for four firm characteristics: market capitalization (in billions of U.S. dollars), return on assets (ROA), leverage, which is the long-term debt divided by the sum of long-term debt and market value of

equity, the price-to-book ratio (P/B), and the number of analysts covering a firm. Firms' financial accounting information is from Compustat Global. The data on financial analysts comes from I/B/E/S database. We again observe wide differences in these firm characteristics across home markets. The largest firms with mean market cap in excess of $96 billion come from the United States, while the smallest are from Indonesia and New Zealand with the market cap of only about $0.6 billion. The firms from Australia and Hong Kong tend to be the most profitable as their ROAs are the largest across 40 countries, and those from Italy (with negative ROA) and Portugal are the least profitable. We further observe that the least levered firms are from the oil-rich and cash-rich countries, the Arab Emirates and Kazakhstan, while the most levered are from Iceland and New Zealand. We then observe that based on the P/B ratio, firms from Mexico, Finland, and Ireland are the most overvalued. The P/B ratio is the lowest for firms from Indonesia and the Arab Emirates. Finally, in terms of the number of analysts, firms cross-listed from such countries as Finland, Germany, and Spain receive the largest coverage, constituting on average of 44, 33, and 33 analysts, respectively.

Our first evidence on the importance of foreign listings on the strength of the relation between CDS and stock returns is presented in Figure 1. It shows the average quarterly correlations between daily CDS returns and stock returns twelve quarters before and twelve quarters after the foreign listing event.[12] We observe that the average correlation between the two series before a firm's stock issuance overseas fluctuates around negative 0.12. Within the first year after the cross-listing event, this correlation substantially strengthens, jumping below negative 0.20, which reflects an increase about 70%. This change is permanent and persistent. In the following quarters, it remains at approximately the same higher level in absolute values.

3. Empirical Results

[12] To smooth the series, each point on the plot represents the mean correlation over three adjacent quarters: *t*-1, *t*, and *t*+1.

Our main empirical tests between firm *i*'s CDS return at time *t*, $CDS_{i,t}$, and the corresponding stock return, $R_{i,t}$, are based on the following regression:

$$CDS_{i,t} = c_0 + c_1 R_{i,t} + c_2 R_{i,t-1} + c_3 CL \times R_{i,t} + c_4 CL \times R_{i,t-1} + c_5 CDS_{i,t-1} + c_6 CL_i + \\ + \delta Market\_Controls_t + \theta Firm\_Controls_{i,t} + \gamma_i + \varepsilon_{i,t}, \quad (1)$$

where CL is a dummy variable which equals one after foreign listing and zero otherwise, while $Market\_Controls_t$ and $Firm\_Controls_{i,t}$ are the sets of market-wide and firm-level control variables. Market variables include the MSCI world index return ($R_{w,t}$), the residuals from regressing the home market MSCI country index return on the world index return ($R_{c,t}$), the daily change in the CBOE volatility index (ΔVIX_t), the daily change in the default spread (ΔDS_t), and the daily change in the U.S. term spread (ΔTS_t). Firm controls include ROA, leverage, and the P/B ratio. We estimate Model (1) with firm fixed effects (γ_i) to account for unobserved and time-invariant firm-specific heterogeneity and double-cluster the standard errors by firm and time. Model (1) allows us to test our main hypothesis, which conjectures an increase in capital structure integration after a firm decides to cross-list its shares abroad. More formally, we can state it as follows:

Hypothesis 1*: Cross-listing increases the co-movement between CDS and stock returns.*

Therefore, the coefficients of primary interest in our study are c_3, and to a lesser extent c_4. Model (1) follows and extends the methodologies in Acharya and Johnson (2007) and Hilscher, Pollet, and Wilson (2015) to account for cross-listing events and controls of various firm and market characteristics. The inclusion of proper country-level controls, in addition to firm-level ones, is of utmost importance since the decision to list firm shares on a foreign exchange often coincides with the outperformance of home and host markets for cross-listed securities (see Sarkissian and Schill, 2014). We also include U.S. default and term spreads as relevant proxies for both global stock and bond risk factors following Fama and French (1993), Ferson and

Harvey (1991, 1993), among others. In addition, we control for U.S. macroeconomic and financial variables, including VIX, as Pan and Singleton (2008), Longstaff, Pan, Pedersen and Singleton (2011), and Augustin and Tedongap (2014), for example, show that they are closely related to the co-movement of sovereign spreads across many countries, which in turn may be associated with variation in spreads of financial and corporate CDS spreads (Acharya, Drechsler, and Schnabl, 2014).

3.1. Aggregate Tests

Table 4 shows the overall impact of cross-listings on the co-movement between CDS and stock returns using Model (1). The table also reports the number of observations and the adjusted R-squared. The first four columns use the full data sample with different specifications of equation (1). Regression 1 does not include control variables. Similar to previous studies (Hilscher, Pollet, and Wilson, 2015), we find that both contemporaneous and lagged stock returns negatively and significantly (at the 1% level) affect CDS returns, even when firms are listed only on local exchanges. However, the low magnitude of these relations ($|c_1| = 0.13$ and $|c_2| = 0.09$) indicates that the equity and CDS markets are effectively segmented. More importantly, we can see that the coefficient c_3 on the interactive term $CL_{\times} R_{i,t}$ is also negative and significant, but its magnitude (0.21) substantially exceeds that of c_1. The coefficient c_4 on the lagged term $CL_{\times} R_{i,t-1}$ is also negative and significant at the 5% level, but it is five times smaller in magnitude than c_3. This suggests that cross-listing placements primarily enhance the contemporaneous integration between firms' equity and credit sensitive securities.

Regressions 2 and 3 of Table 4 also include contemporaneously observed market-level variables. Their inclusion drops coefficient c_1 to 0.05 in absolute value, but it retains its high statistical significance. The introduction of these variables also leads to the reduction in the magnitude of coefficient c_3 to 0.15. The relative difference in the values of coefficients c_1 and c_3, which has now increased, implies that accounting for market controls highlights even more profoundly the role of cross-listing for increasing the co-movement between firms' two asset

classes, equity and debt. Moreover, the magnitude and statistical significance of the relation between lagged stock returns and current CDS returns is effectively unaffected by the additional common controls. With respect to market variables themselves, we find a significant relation to CDS returns of both world and local market returns (both with a negative sign), as well as the changes in the default spread (with a positive sign). A further inclusion of firm-level controls does not alter the qualitative and quantitative picture obtained in previous specifications.

Columns 5 and 6 of Table 4 report the estimation results of Model (1) split in two sub-samples: 2001-2007 and 2008-2013, i.e., before the global financial crisis of 2008 and after the start of the crisis. We observe that the negative contemporaneous relation between stock and CDS returns is much stronger in the second sub-period. This link is still larger after a firm places its shares in foreign markets. The absolute values of coefficient c_1 are 0.04 and 0.12 for the pre- and post-crisis periods, respectively. Similarly, the magnitude of coefficient c_3 is 0.07 before 2007, but it increases to 0.11 for the time period after that. Note that the negative relation between the lagged stock returns and current CDS returns strengthens in statistical and economic significance after cross-listing in the second sub-period.

Finally, the last two columns of Table 4 show the estimation of Model (1) split into sub-sample of cross-listings placed in the United States (US Host) and that placed outside the United States (Non-US Host). We find that the negative contemporaneous relation between stock and CDS returns after the placement of foreign listings is stronger for firms that are cross-listed in markets other than the United States: the magnitude of coefficient c_3 is 0.07 for the US Host sample and 0.19 for the Non-US Host one. This result, which may be surprising at first glance, is, in fact, not so astonishing. Many firms that issue cross-listings in the United States already have prior experience with foreign share placements in other markets (35% of our sample). As Sarkissian and Schill (2009) show, the first foreign listing usually has significantly higher impact on firm's stock return dynamics than subsequent cross-listing placements.

Our next and very important step is to show that the patterns reported in Table 4, i.e., an increase in co-movement between firm CDS and stock returns after foreign listing, are driven

solely by cross-listings, and that they are not related to firm or country-specific market characteristics. To accomplish this, we examine the properties of a matched control sample of firms without cross-listings, but with similar firm characteristics and co-movement between CDS and stock returns. The matched sample is constructed by minimizing the normalized four-dimensional Euclidean distance between the sample of cross-listed and 2,016 non-cross-listed firms based on four essential (demeaned and standardized) firm characteristics, namely: the leverage ratio, the correlation between CDS and stock returns, the credit rating, and market capitalization. The correlation between CDS and stock returns is a particularly important matching criterion, as it ensures that we match firms on past *trends* in cross-asset integration. Credit Ratings, which we map into a numerical rating scheme ranging from AAA = 1 to C = 21, correspond to the S&P long-term credit ratings from Compustat RatingsXpress. In addition, , we require a matched control firm to be headquartered in the same geographical region as the cross-listed firm, using the United Nations geoscheme, which classifies countries in six distinct regions, i.e., North America, Latin America and the Caribbean, Europe, Africa, Asia, and Oceania.[13] We match firms with replacement based on the closest normalized Euclidean distance, using the firm characteristics corresponding to the year immediately prior to the year of the actual cross-listing date. Matched firms are assigned a pseudo cross-listing date identical to that of the corresponding cross-listed firm. The total sample of non-cross-listed firms from which the matching firms are selected is 2,016, and the sample of matched firms is 202. Table 5 shows the mean and standard deviation of the four firm characteristics used to determine the foreign listing propensity for cross-listed and matched non-cross-listed firms, as well as the tests for differences in means. All reported characteristics correspond to the year immediately before the (pseudo) cross-listing date. We can see that firm characteristics of matched firms are very similar

[13] We have also examined propensity-score matching techniques, and we imposed the restrictions that a matched control firm must be headquartered in the same country as the cross-listing firm, or that is operating in the same industry based on the two-digit SIC code. Our results are unchanged and are available upon request.

to those of cross-listed firms: difference tests reveal no significant differences between the two firm samples.

Table 6 shows the impact of cross-listing on the co-movement of a firm's CDS and stock returns for cross-listed firms and matched firms. The dependent variable – the daily CDS return, – as well as all controls and fixed effects are as in Table 4. We first present estimations without control variables in columns 1-3. Column 1 reports the estimates for matched firms. For the ease of comparison, we report in column 2 the estimates of column 1 from Table 4. First, note that stock returns of matched firms (both contemporaneous and lagged) again negatively and significantly affect CDS returns, even for locally listed firms. Moreover, their estimates are very close to those of cross-listed firms. This formally underscores the fact that the matched and cross-listed samples are similar. Second, we observe that the coefficient c_3 on the interactive term $CL_{\times} R_{i,t}$ for matched firms is negative, similar to that for cross-listed firms. Its magnitude is, however, almost ten times smaller than that for the cross-listed firm sample, and it is statistically insignificant. In column 3, we perform the difference-in-differences (DID) estimation between the two firm samples. The findings confirm our observations from columns 1 and 2. That is, there is some statistical evidence of the decrease (increase in absolute terms) in correlation between CDS and stock returns after "pseudo" listing for the matched sample, but this drop is markedly smaller when we compare it to the decrease in correlation for the sample of cross-listed firms. The estimations in columns 4-6 include all the control variables. Again, column 4 shows the results for the matched sample, column 5 – a repeat for the cross-listed sample (from column 4 of Table 4), and column 6 shows the DID results. An important difference from the inclusion of market and firm-level controls is that the coefficient on the interactive term $CL_{\times} R_{i,t}$ for the matched firm sample reduces almost to zero, and remains statistically insignificant, as seen in columns 4 and 6. This suggests that once we account for market trends, the average treatment effect is economically large and significant – cross-listing leads to a substantial increase in co-movement between CDS and stock returns.

Thus, Tables 4 and 6 illustrate an indispensable role of foreign listings in improving the integration between equity and debt markets, as predicted by Hypothesis 1.[14] The observed effect of cross-listings is in line with the investor recognition hypothesis of Merton (1987). Studies such as Foerster and Karolyi (1999), Baker, Nofsinger, and Weaver (2002), Lang, Lins, and Miller (2003), Ahearne, Griever, and Warnock (2004), among many others, all point out that foreign listings increase firms' integration with global markets through increased investor pool and visibility. A firm's increased informativeness with investors worldwide through one of its asset classes must inevitably lead to increased recognition of its other assets as well, especially those traded globally. Therefore, as a consequence of cross-listing, the extra risk premia present in firm's stock and CDS returns should diminish, leading to a greater alignment between a firm's different asset classes. These results are also consistent with Barber and Odean (2008), who emphasize that "glamor-stocks" receive more attention from individual and institutional investors and with Duffie (2010), who rationalizes how limited attention can distort the dynamics of asset prices.

In line with this reasoning, in Table 7, we show the changes in two direct proxies for increased firm visibility, the number of analysts and CDS depth, before and after the cross-listing event. The last two columns of the table report the difference in each of the two measures between the two periods ("after" minus "before") and the corresponding t-statistic of this difference. We can see that both the analyst coverage and the quoting counts of unique market makers for CDS contracts significantly increase after a firm places its shares in foreign markets. Therefore, cross-listing enhances a firm's global visibility, and, as a result of that, increases synchronicity in returns on the firm's different asset classes.

3.2. Tests across Firm and Market Characteristics

[14] We note that our main result – the negative and significant coefficient c_3 – is robust to additional variations in the estimation of Model (1). These alternative specifications include: country fixed effects, time fixed effects, the sub-sample of observations with no stale quotes, as well as the sub-sample of observations with CDS trading that exist before the cross-listing event. These test results are available on request.

Having established the visibility link between the cross-listing event and improved integration of a firm's capital structure, the next natural step is to examine how inner visibility characteristics of firms and markets affect the strength of this relation. Larger firms are better known to investors, and so one should expect more closeness between changes in firm stock prices and CDS spreads after placements of foreign listings by larger size firms. Likewise, firms with high credit quality have lower CDS spreads and, therefore, should be more attractive and visible to investors. In Table 7, we already observed that analysts coverage and CDS coverage increase after cross-listing. It implies, therefore, that the larger is the change in these two measures, the larger should be the change in integration between firm stock and CDS returns after cross-listing.

Firm visibility on the international arena may be due to firm-specific characteristics, but also to cross-market familiarity. Sarkissian and Schill (2004) find that cross-listings are more likely between more familiar countries, the investors of which show more appetite for holdings in each-others' firms. Therefore, placing a foreign listing in a familiar market is likely to increase the alignment of a firm's stock and CDS returns more than when it is placed in a less known market. Therefore, we can formulate our next hypothesis as follows:

Hypothesis 2*: Cross-listing increases the co-movement between CDS and stock returns more for visible firms.*

Table 8 shows the impact of cross-listing on CDS and stock return co-movement across sub-samples of various firm characteristics which proxy firm visibility and familiarity to investors. All estimations are based on the full specification of Model (1). All control variables are as in Table 4, but their estimates are not reported. Four firm characteristics, namely: market capitalization, credit quality (the inverse of the CDS spread), as well as changes in the number of analysts following a firm, and CDS coverage before and after the cross-listing event, are based on cross-sectional averages. All firm characteristic samples are split at the median to "high" and

"low" sub-samples. For each firm characteristic, the table also reports the results of the difference-in-difference (DID) test between the two sub-samples for the impact of cross-listing on the relation between contemporaneous and lagged stock returns and CDS returns, as well as the corresponding absolute t-statistics.

The first two columns of Table 8 show the sample split by high and low market capitalization firms. As expected, we observe that, after the foreign listing, the increase in the contemporaneous synchronicity between firms' stock and CDS returns, measured by coefficient c_3, is large and significant only for large size firms. The DID test confirms a highly significant difference in this impact between the two sub-samples. Likewise, we also find strong evidence for the importance of lagged stock returns for CDS returns (coefficient c_4) only for the larger firm sub-sample, and the DID estimation supports this observation. The third and fourth columns of the table report the sample split by high and low firm credit quality. We see that the introduction of cross-listing by high quality firms leads to both a markedly larger magnitude of the coefficient on $CL_{\times} R_{i,t}$, and a statistically and economically significant coefficient on $CL_{\times} R_{i,t-1}$. The two DID tests highlight these results more formally. Furthermore, we can see the same general picture based on the results of the remaining two cross-sectional firm characteristics, changes in the CDS coverage and analyst coverage measures. In both of these cases, the coefficient c_3 is significant and economically larger for sub-samples with greater changes in these two measures. In addition, the DID tests show that the difference in the coefficient c_4 between high and low CDS coverage change sub-samples is highly significant, and that between high and low analyst coverage change sub-samples is significant at the 10% level.

We investigate the possibility of firm visibility enhancement due to cross-market characteristics in Table 9. It shows the impact of cross-listings on the co-movement of stock and CDS returns for two cross-country closeness characteristics: geographic proximity and cross-country correlation. Geographic Proximity is the great circle distance between the capital cities of the home and host markets for cross-listings. Cross-country correlation is the average correlation of returns on market indices between home and host markets of cross-listed firms.

Each cross-country characteristic sample is split at the median. Again, all control variables are the same as in Table 4, but we do not depict their estimates. Also, as in Table 8, for each characteristic, we show the DID test results between the two sub-samples alongside with their corresponding absolute t-statistics.

The first two columns of Table 9 report the estimates for the sample split by high and low geographic proximity. The last two columns deal with the sample split by high and low cross-country correlation. We observe that cross-listings in close-by countries are significantly more conductive to improving co-movement between stock and CDS returns. In a similar vein, listings placed in host markets with high equity market correlation with the firm's home country also play a larger role in strengthening the cross-asset integration. The magnitude of coefficient on the interactive term $CL_{\times} R_{i,t-1}$ for proxies of highly familiar markets is about three times larger than that for less known markets. Similar to the results in Table 8, we also observe a significant impact of cross-listings on the relation between lagged stock returns and CDS returns for firms from highly known markets. The DID tests support both these observations. Thus, taking together the results in Tables 8 and 9, we can state that, consistent with Hypothesis 2, firm-level and cross-market visibility provides an important prerequisite for the efficiency of foreign listing as an enhancement tool for cross-asset integration. [15]

4. Direct Pricing Discrepancies Tests

In this section, we build upon our earlier results and offer an alternative methodology proposed by Kapadia and Pu (2012) to show that cross-listing increase the synchronicity in return dynamics between firms' stock and CDS markets. They propose a simple test of integration between equity and CDS markets that captures price discrepancies in changes of firms' stock prices (ΔP) and CDS spreads (ΔCDS). It is assumed that the equity and CDS

[15] Note that using firm and cross-market characteristics from Tables 8 and 9 as additional controls in Model (1) does not affect our results qualitatively or quantitatively. The results of these estimations are available on request.

markets are aligned if ΔCDS×ΔP < 0, that is, if CDS spreads and stock prices move in opposite directions, consistent with Merton (1974). They are neither aligned nor misaligned when ΔCDS×ΔP = 0, while the two markets are assumed to be misaligned if ΔCDS×ΔP > 0. In this case, a pair of stock prices and CDS spreads presents an arbitrage opportunity. Kapadia and Pu (2012) define the integration measure κ_i between stock and CDS markets of firm *i* based on the frequency of such arbitrage opportunities. More specifically:

$$\kappa_i = \sum_{k=1}^{M-\tau} I\left[\Delta CDS_{i,k}^{\tau} \times \Delta P_{i,k}^{\tau} > 0\right], \tag{2}$$

where I is an indicator function, P_i and CDS_i are the stock price and CDS spread of firm *i*, $\Delta CDS_{i,k}^{\tau} = CDS_i(k+\tau) - CDS_i(k)$, $\Delta P_{i,k}^{\tau} = P_i(k+\tau) - P_i(k)$, τ is the estimation horizon in days, and M is the number of observations of CDS spreads and stock prices for a given date. All pricing discrepancy measures are computed over non-overlapping time intervals.

Table 10 shows the frequency of price discrepancies for five intervals of τ being equal to 1, 5, 10, 25, and 50 days. We report the means and standard deviations of frequencies of stock and CDS market alignment, ΔCDS×ΔP < 0, no relation, ΔCDS×ΔP = 0, and misalignment, ΔCDS×ΔP > 0, before and after the cross-listing event. The last two columns of the table report the difference in the pricing discrepancy for each of its three cases before and after the cross-listing, Diff(After-Before), and the corresponding absolute t-statistic. Panel A reports the results for the full sample of firms. We can see that cross-listing drastically improves the synchronicity between changes in stock prices and CDS spreads. First of all, the instances of alignments between the two markets, ΔCDS×ΔP < 0, go up significantly for four out of five estimation intervals. For example, for a one-day interval, the alignment between the markets occurs 51% of the time after the cross-listing as opposed to only 33% before the cross-listing. Second, the instances of no relation between stock and CDS markets, ΔCDS×ΔP = 0, after the listing go down significantly for the three shortest estimation intervals of one, five, and ten days. This decrease is the most profound for τ = 1, for which the drop equals 25%. Finally, we also observe

a substantial decrease in the frequency of misalignment between the two markets. It is negative in four out of five cases and significant for $\tau = 5, 25$.

It is possible that our results in Panel A of Table 10 are affected by firms that are included into the sample in a later period, since about 40% of all CDS contracts occur more than three months after the cross-listing. To account for this potential concern, in Panel B we present Kapadia and Pu (2012) tests for the same sample of firms that have stock and CDS return data at least one year before and one year after the cross-listing. There are 79 such companies. We observe that, in spite of this restriction, the overall results are very similar to those in Panel A. As before, the cross-listing markedly improves the frequency of alignment between changes in stock prices and CDS spreads. The average improvement is 10% for one-day intervals and 4% for five-day intervals and these changes are significant. Again, after foreign listing, the occurrences of no-relation between the two markets go down, especially for the one-day interval, for which the drop is 13%. Cross-listings also significantly reduce the cases of misalignment and arbitrage opportunities for $\tau = 5, 25$. Thus, overall, with few exceptions, the short-horizon mispricing between the equity and CDS markets is drastically reduced after cross-listing, confirming our earlier findings on the importance of foreign listings for increased synchronicity between the two markets.

The price discrepancy measures rely exclusively on the concordance of stock and CDS prices. This is useful, as it enables a direct mapping of κ_i into the Kendall correlation measure, $\hat{\kappa}_i$, defined as:

$$\hat{\kappa}_i = 4\,\kappa_i / M\,(M-1) - 1, \tag{3}$$

which has the advantage of having well-known statistical properties to test for inference. In the absence of mispricing, $\hat{\kappa}_i = -1$, and the higher its value, the less integrated is the capital structure of a firm. In Panel C, we therefore examine the Kendall correlation measure over the same horizons of 1 to 50 days. We report the results for the samples of both cross-listed firms

and matched firms without cross-listing. There is a decrease in integration after the cross-listing event for both the treated and control firms. This is expected, as we have directly matched firms on their past stock-CDS return correlation trend. Importantly, the increase in integration is significantly higher for the sample of cross-listed firms, as demonstrated by the statistically significant DID estimator for trading horizons of one and five days.

While the price discrepancy and integration tests are suggestive of an increase in the synchronicity between a firm's stock and CDS returns after a firm cross-lists abroad, we now proceed to more formal tests of capital structure integration. In particular, we exploit the cross-sectional differences and time-series variation in the Kapadia and Pu (2012) integration measure, $\hat{\kappa}_i$, focusing on trading horizons of five days.[16] Similar to those authors, for the regression analysis we apply a log-transformation to the Kendall correlation measure $\hat{\kappa}_i$ as follows:

$$\hat{\kappa}_i = 0.5\, ln\left(\left(1 + \hat{\kappa}_i\right)\Big/\left(1 - \hat{\kappa}_i\right)\right). \tag{4}$$

More specifically, we examine whether there is an increase in the capital structure integration (i.e., a more negative measure of integration) after the cross-listing event that is significantly greater for the sample of cross-listed firms than for the sample of matched firms without cross-listing. Table 11 confirms our conjecture. The treatment indicator D interacted with the indicator variable that takes the value of one after the cross-listing event, CL, is significant at the 1% level across all specifications. These findings are robust to the inclusion of daily time fixed effects, and both time-varying observable and time-invariant unobservable firm-specific control variables.[17] The economic increase in integration is significant too. The magnitude of the coefficient on the interaction term ranges between 0.047 and 0.051. Given that

[16] We have verified our results for different trading horizons, and their statistical significance is higher for shorter periods, as expected.

[17] Firm controls include seven firm characteristics: Leverage, which is the leverage ratio; EqVol, which is the quarterly firm equity volatility; MkCap, which is the natural logarithm of the market capitalization; ZeroSpread, which is the proportion of trading days with stale returns in the five-year CDS Spread; DepthCDS, which is the number of dealers providing quotes for the computation of mid-market CDS spread; ZeroRet, which is the proportion of trading days with zero stock returns; and IVol, which is the idiosyncratic volatility of the residuals from regressing firm-specific stock returns on the MSCI world index return and MSCI country index returns.

the average magnitude of the integration measure before cross-listing is 0.096 at the five-day trading horizon, this corresponds to an increase in integration of 50%. Importantly, our effects are not impacted after controlling for a series of stock and CDS liquidity measures, including the frequency of stale returns in stock and CDS markets, CDS depth, the Amihud illiquidity measure, stock trading volume, and idiosyncratic volatility. This suggests that an increase in integration after cross-listing cannot be explained by a change in liquidity in any of those two markets.[18]

Our results are visually underscored in Figure 2. In this plot, using a trading horizon of five-days, we show the (moving-average and de-trended) dynamics of the Kapadia and Pu (2012) integration measures for the samples of cross-listed and matched firms. There is a marked increase in integration between stock and CDS returns among cross-listed firms (i.e., a decrease in the integration measure) that is not observed for the sample of matched firms.

5. World Market Integration Tests

An increasing co-movement of firms' CDS returns with their stock returns after the foreign listing event implies an increasing exposure of CDS contracts to the sources of risks that determine the dynamics of firms' equity returns. In imperfectly integrated global capital markets, returns of stocks are exposed to both worldwide and local risks (Errunza and Losq, 1985). The usual proxies for these risks are the world and local country equity portfolio returns, R_w and R_c, respectively. Moreover, Augustin (2013) shows that both global and local risk factors drive sovereign credit risk, although their relative importance varies over time, and a shock to sovereign CDS spreads may spill over to both financial (Acharya, Drechsler, and Schnabl, 2014) and non-financial corporations (Lee, Naranjo, and Sirmans, 2015). Therefore, an increasing synchronicity between CDS returns and stock returns after a foreign listing placement must lead

[18] We also allow for a time trend in liquidity by interacting all liquidity metrics with the cross-listing indicator variable. These results are quantitatively identical, and we do not report them for the sake of brevity.

to increasing loadings of CDS returns on *both* world and local equity-based risk factors. Indeed, as a firm becomes more visible to a larger pool of international investors after placing its shares on a foreign exchange, one should anticipate an improvement in the co-movement of its CDS with the world equity market index. Also, since foreign listing increases the return co-movement of a firm's CDS with its own stock shares, it should also increase its CDS co-movement with the firm's domestic equity market as a whole.

In spite of the similar projected directional changes in the commonality between CDS returns on the one side and the world and local markets on the other, their magnitude is likely to be different. We expect a larger change in the sensitivity of CDS contracts to the world market portfolio than to the local market because of the following reason. After cross-listing, the beta of a firm's stock returns should increase with respect to the world market portfolio and decrease with respect to the local market. Empirical studies usually find statistically significant support for cross-listing-associated changes in at least one of those two betas, especially for firms from emerging countries (see Foerster and Karolyi, 1999; Sarkissian and Schill, 2009; Lewis, 2015). This means that a firm's cross-listing increases the co-movement between both its stock and CDS returns, as shown in the previous section, and its stock return and the world, but not local market returns. Therefore, an increase in the sensitivity of CDS contracts towards the world market portfolio should be larger than that towards the local equity index. This reasoning allows us to state the following hypothesis:

Hypothesis 3*: Cross-listing increases the sensitivity of CDS returns to both world and local equity markets, with a greater increase to the world equity market.*

To test our hypothesis, we build upon Foerster and Karolyi (1999), among others, and estimate the following regression model separately for each firm's stock and CDS returns one year before and one year after the cross-listing event, excluding the event day:

$$\begin{Bmatrix} R_{i,t} \\ CDS_{i,t} \end{Bmatrix} = \alpha_i + \beta_{i,w} R_{w,t} + \beta_{i,c} R_{c,t} + \gamma_{1,i} TS_t + \gamma_{2,i} DS_t + \varepsilon_{i,t}, \quad (5)$$

where $\beta_{i,w}$ and $\beta_{i,c}$ are the world and local market betas of firm i, respectively. Variables TS and DS are the two global bond market controls, the term spread and default spread, and we add them to the model following Fama and French (1993). Then we take the average of each beta across all firms and arrive to the world and local betas, β_w and β_c, before and after the foreign listing event. Under the assumption of integrated stock and CDS markets at the firm level, their world and local market betas must be about the same, but with opposite signs. To be included in our estimation, a firm must have at least one year of stock and CDS return history before and after the cross-listing event. Recall that there are 79 such firms in our sample.

Table 12 shows the estimation results of Model (5). We report the average estimates of β_w and β_c before and after cross-listing, as well as the difference test for these estimates between the two periods with the corresponding absolute t-statistics. Columns 1-3 of the table deal with the restricted version of Model (5) that includes only the two stock market indices; columns 4-6 are based on the full specification of Model (5). In the upper panel, it depicts the results for the equity market integration test. Based on the equity market factors alone, the average world and local market betas of firms in our sample before the cross-listing are 1.03 and 0.82, respectively. Since in theory the average β_w across all firms in the world is 1.00, we can infer that firms in our sample are fairly well integrated with the world market portfolio, even before placing shares in foreign markets. This is sensible for the following two reasons. First, most of the firms that are about to cross-list are the largest and best performing firms in their respective home markets (e.g., Sarkissian and Schill, 2014). These firms are already likely to be integrated and could have placed shares on foreign exchanges before the start of our sample period.[19] Second, our cross-listing and CDS samples are overwhelmingly dominated by firms from developed countries. Firms from such countries are shown to be integrated with the world in earlier studies (e.g., De

[19] In addition, our sample is restricted to firms with traded CDS data. These are also more likely to be larger and more developed firms.

Santis and Gerard, 1997). As a consequence, after cross-listing there is little room for significant changes in β_c, and especially β_w, among our 79 firms. In terms of the medians, β_c changes from 0.90 to 0.80, while β_w from 1.03 to 0.98.[20] We observe a similar pattern in β_w and β_c after using the full specification of Model (5) in the last three columns of the panel.

More importantly, the lower panel of Table 12 shows the CDS market integration test results. Based on the two equity factor equivalent of Model (5) (columns 1-3), we can see that, before cross-listing, β_w and β_c of CDS returns are -0.63 and -0.19, respectively. After the foreign listing, both these estimates increase in magnitude becoming -0.90 for the world market beta and -0.29 for the local beta. These results support the first part of Hypothesis 3, although only the change in the world market beta is statistically significant. Note that the CDS world market beta is much closer to the corresponding beta based on stock returns in the upper panel (with the opposite sign) after the cross-listing event than before it. Importantly, the change in β_w is larger in magnitude than the change in β_c: 0.27 versus 0.10 (or 0.13 and 0.01 for the medians). These findings remain qualitatively and statistically intact after accounting in the estimation for the two additional global bond factors in columns 4-6. Thus, our results support Hypothesis 3 overall.

Finally, we note a decrease in the average CDS spreads after cross-listings in accordance with the diminishing extra premium of Merton (1987) resulting from increased investor recognition and higher integration of firms' securities with the world. While the average CDS spread before cross-listing is about 150 bps, it drops to about 100 bps after the cross-listing event. Due to the high volatility of spread estimates, the decline is not significant, but almost 60% of firms experience a drop in their CDS spreads after the cross-listing event. This evidence is also consistent with Duffie and Lando (2001), who show how incomplete information can affect both the level and shape of the term structure of CDS spreads. Enhanced visibility of firms through multi-market trading increases investor scrutiny and arguably fosters informational transparency.

[20] In unreported Chi-square tests for the equality of medians, we observe no statistical difference in the world market betas before and after cross-listing, but the local market beta is significantly lower after the listing placement.

6. Robustness Tests

We document a significant increase in cross-asset co-movement and capital structure integration following the foreign cross-listing placement, and we attribute this effect to an increase in investor attention due to the higher visibility associated with the firm's presence in the foreign market. We now provide several robustness tests to further validate our findings, and to mitigate concerns that alternative channels could explain our results.

First, we examine whether all our effects on the stock-CDS movement are robust to the inclusion of various liquidity measures. Existing studies suggest that the lack of liquidity in the home country may impact the decision to cross-list.[21] Therefore, we want to see that changes in the liquidity of both the stock and the CDS markets are insufficient to fully capture the increase in their co-movement following the cross-listing event. To accomplish this, we augment our benchmark regression with a number of stock and CDS liquidity measures, including the frequency of stale returns in stock and CDS markets, CDS depth, the Amihud illiquidity measure, stock trading volume, and idiosyncratic volatility. Table 13 reports the estimation results. The first three columns show the results for the matched and cross-listed samples as well as their DID tests when controlling for stale prices in the CDS and stock markets. These variables are denoted as ZeroSpread and ZeroRet, respectively. ZeroSpread is the proportion of trading days with stale returns in the five-year CDS spread, while ZeroRet is the proportion of trading days with zero stock returns. The last three columns show the results for the matched and cross-listed samples as well as their DID tests when controlling for CDS depth (DepthCDS) and Amihud illiquidity (Illiquidity). DepthCDS is the number of dealers providing quotes for the computation of the mid-market CDS spread, while Illiquidity denotes the Amihud (2002) illiquidity measure based on price impact. Across the entire table we can see that none of the

[21] Earlier studies include, but are not limited to, Tinic and West (1974), Werner and Kleidon (1996), and Domowitz, Glen, and Madhavan (1998).

liquidity measures are able to drive out the economic and statistical significance of our findings, even though some of the liquidity metrics have important contribution to CDS spreads as well. As before, the coefficient on $CL \times R_{it}$ is negative and significant only for the cross-listed sample. This suggests that an increase in the firm's capital structure integration after cross-listing cannot be fully explained by a change in liquidity in the stock or CDS markets.

Second, we examine the impact of "bad controls" on the stock-CDS return relation after the cross-listing, following the empirical identification design of Angrist and Pischke (Princeton University Press, 2009, Chapter 3). In our regressions, we control for the observable firm characteristics and show that the increase in co-movement between the stock and CDS markets is not impacted by changes in firms' market capitalization, size, leverage, or return on assets. One concern may be that all these variables depend themselves on the cross-listing decision, and so controlling for them may cloud the interpretability of our key regression coefficient. Therefore, in Table 14 we drop the control variables and replace them with the interaction of the home country and weekly time fixed effects: they account for unobservable time-varying factors that may impact CDS spreads. As columns 1-3 of Table 14 show, the results are, if anything, stronger than in the benchmark regression.

Third, to account for potential non-linearities between debt and equity returns we include the squared stock market return and its interaction with the cross-listing indicator variable in columns 4-6 of Table 14. The coefficients on the squared terms are insignificant and do not impact the economic or statistical significance of the change in stock-CDS relation after cross-listing, $CL \times R_{it}$.

Fourth, we examine the relation of changes in CDS spreads with lead and lagged stock returns around the cross-listing event for both the treatment and matched control groups. More precisely, we run the following regression model:

$$\begin{aligned} CDS_{i,t} = {} & c_0 + c_1 R_{i,t} + c_2 R_{i,t-1} + c_3 CL \times R_{i,t-1} + c_4 CDS_{i,t-1} + c_5 CL_i + \\ & + \sum_{\tau=0}^{m} \delta_{-\tau} D_{CL-\tau} \times R_{i,t-1} + \sum_{\tau`=1}^{q} \delta_{+\tau} D_{CL+\tau} \times R_{i,t-1} + \boldsymbol{\theta}_t + \gamma_i + \gamma_i \times \boldsymbol{\theta}_t + \varepsilon_{i,t} \end{aligned}, \quad (6)$$

where the sums on the right-hand side allow for a change in the stock-CDS return relation with *m* leads ($\delta_{-\tau}$) and *q* lags ($\delta_{+\tau}$) relative to the actual cross-listing date. In addition, we control for firm fixed effects, time fixed effects, and the interaction between weekly time and firm fixed effects. Columns 1-2 of Table 15 report the results for both cross-listed and matched firms with leads up to two years prior to cross-listing, and lags up to four years after the cross-listing. Only the coefficients on the interaction effects after the cross-listing are significant, while the coefficients on the anticipatory effects are not, and therefore we do not report their estimates. The patterns of the lagged effects are interesting on their own, as they indicate that the stock-CDS return co-movement becomes stronger over time. For the sample of matched firms, all interaction coefficients are statistically indistinguishable from zero (apart from the three-year lag coefficient, which is significant at the 10% level only). The insignificance of the coefficients in the period before the cross-listing further validates the parallel trend assumption, which is a necessary condition for a valid differences-in-differences framework that we apply in this paper. Columns 3-4 report a similar specification with leads and lags of up to eight quarters. The results are both qualitatively and qualitatively identical. All coefficients prior to the actual cross-listing date are insignificant for both the treatment and control groups, thereby validating the parallel trend assumption. Therefore, to conserve some space, we again do not report their estimates. On the other hand, the coefficients are all significant after the formal cross-listing only for the treatment group, increasing in magnitude from 0.108 to 0.205 over the two years following the cross-listing. Figure 3 visualizes the increase in co-movement due to the cross-listing event.

Fifth, we directly examine the fact that the decision to cross-list is not impacted by the past CDS-stock return co-movement or the past level of capital structure integration. In Table 16, we report the results from a multinomial logistic regression that predicts the cross-listing decision based on the contemporaneous and past CDS-equity co-movement or integration. We project our cross-listing dummy, CL, on the past quarterly Pearson correlation coefficients between daily CDS and equity market returns of firm *i* in quarter *t,* or the transformed Kendall correlation measure, respectively, i.e.:

$$Pr\left(CL = 1 \mid X\right) = 1/\left(1 + e^{-X}\right), \quad (7)$$

where $X = \alpha + \gamma_t + \beta\, CDS\_Equity\_Comovement_{i,t} + Controls_{i,t} + Home \times Host\_FE$. The results suggest that neither the past correlation between CDS and stock returns, nor their past integration measures are able to predict future cross-listing. Even though the findings suggest that the both stock and CDS liquidity impact the decision to cross-list, cross-listing events are independent of the co-movement between changes in CDS and stock prices.

Sixth, there could be a concern that the observed increase in the stock-CDS return co-movement is driven by a trend in the firm size, and that we counterfactually find that an increase in this co-movement is associated with the cross-listing event. Therefore, in the tests in Table 17, we allow for a differential trend in market capitalization and other key firm control variables following the cross-listing event by interacting them with the cross-listing indicator. The results show again that allowing for trends in firm characteristics cannot explain the significance of our findings: the DID regression coefficient, $D \times CL \times R_{it}$, remains significant at the 1% level, and the magnitude remains unchanged at 0.17.

Seventh, the reader may worry that our results are driven by market-wide events that coincide with the firm-level cross-listing placement chronology between different pairs of countries. For instance, Sarkissian and Schill (2009) show that foreign listing placements from one country to another coincide with overvaluations in the respective home and host markets. To account for this possibility, we augment our main tests based on Model (1) with additional interactive variables formed with the world and country returns, and the cross-listing dummy. Since global equity and bond markets are not fully integrated, we also use, in addition to global and local equity returns, the world and country returns on bond indices. The new variables are $R_{w,t}$ (bond) and $R_{c,t}$ (bond). $R_{w,t}$ (bond) defines the Citigroup World Government Bond Index return in U.S. dollars, while $R_{c,t}$ (bond) denotes the residuals from a regression of the Citigroup World Government Bond Index return in each home market on $R_{w,t}$.

Table 18 reports the estimation results. Columns 1 and 2 show the results from the inclusion of interactive terms based on world and country equity returns, as well as the interactive terms $CL \times R_{w,t}$ and $CL \times R_{c,t}$ for the matched and cross-listed samples of firms, respectively. In columns 4 and 5, the bond returns and their interactive terms with the cross-listing dummy are added to the model. Columns 3 and 6 report the results of the corresponding DID tests.[22] Controlling market-wide changes potentially associated with cross-listing events has neither economic nor statistical effect on our earlier conclusions: the coefficient on $CL \times R_{it}$ is again negative and significant only for the cross-listed firms, confirming the importance of cross-listing for the capital structure integration at the firm level. Note that the table also shows negative and significant values for $CL \times R_{w,t}$ and $CL \times R_{c,t}$ for both the cross-listed and the matched samples. This provides evidence of the overall increase in integration between CDS and stock returns during our sample period, which is distinct from the increased alignment between the two markets at the firm level resulting from the cross-listing placement.

7. Conclusions

In this paper, using a global sample of firms with newly placed foreign shares and firm stock and CDS data, we study the impact of cross-listings on the integration between equity and debt markets. Since both firm equity and debt are traded in international capital markets, any changes in the co-movement of these asset classes must be analyzed from the perspective of a global investor. This setting has at least two unique empirical advantages. First, the foreign stock placement, with its clear visibility benefits for the cross-listed firm, as documented in many studies, provides a unique testing ground of the relevance of Merton's (1987) investor recognition hypothesis to cross-asset integration. Second, as the decision to cross-list is independent of the dynamics of a firm's capital structure, foreign listings offer a quasi-natural

[22] The lower number of observations in specifications 4-6 is largely due to the fact that several countries, mainly among emerging markets group, have no data on government bond index returns.

experiment that introduces exogenous variation to the co-movement in the returns of stocks and CDS.

We find that after firm's equity becomes listed on a foreign exchange, the co-movement between its stock and CDS returns increases significantly in both economic and statistical terms. The extent of cross-asset return co-movement after cross-listing is between 60% and 300% higher than that before cross-listing, depending on model specification. This impact is unique to cross-listed companies and cannot be replicated using a matched control sample of non-cross-listed firms. The effect of cross-listing on integration of CDS and stock returns has become larger in the post-2007 period. We further observe that the synchronicity in returns on firm equity and CDS contracts exhibits a greater increase due to cross-listing among more visible firms (across various dimensions), and when foreign listings are placed in countries more familiar with a firm's home country. In addition, using direct world market integration tests, we show that, after cross-listing, the world and local equity market betas of CDS contracts increase, but the increase in the beta on the world market dominates that on the local market. Therefore, our study shows a vital role of the firm's presence in global capital markets on the extent of integration between its different asset classes.

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Table 1. Frequency distribution of foreign listings

Panel A: Distribution of foreign listings across countries

	Host																										
Home	AE	AT	AU	BE	BR	CA	CL	CO	DK	FI	FR	GM	HK	IN	IT	JP	LU	MX	NL	NO	PL	PT	SG	SP	SE	SW	UK	US	Total
Arab Emirates																											1		1
Australia																							1				1	3	5
Belgium															1		2											2	5
Brazil													1															5	6
Canada					1		1	1											1									14	18
Chile																											1	1	2
China																											1	1	2
Colombia																												1	1
Czech Republic																					1								1
Finland															1				1										2
France				1											11	2	1		1							1	1	6	24
Germany		1													9				1							1		3	15
Greece			1																								1	1	3
Hong Kong																												1	1
Hungary																					1								1
Iceland																									1				1
India	1																14										3	2	20
Indonesia																	1												1
Ireland																											1	4	5
Italy											3	1																1	5
Japan											1		1														2	7	11
Kazakhstan																	2												2
Korea																1	5										1	3	10
Liechtenstein																										1			1
Luxembourg											2													1			2	1	6
Mexico																												2	2
Netherlands											2	1			4		1											5	13
New Zealand			2																										2
Norway																												1	1
Portugal																			1										1
Qatar																											1		1
Russia												1															2		3
Singapore													1				1											1	3
Spain															1				1			1							3
Sweden									1	1										1								1	4
Switzerland											1																	3	4
Taiwan																	10											1	11
Ukraine																												1	1
United Kingdom											2		1	1			1		1						1	1		15	23
United States						5					3					1		1	4							3	3		20
Total	1	1	3	1	1	5	1	1	1	1	14	3	4	1	27	4	38	1	11	1	2	1	1	1	2	7	21	86	241

Table 1 (continued)

Panel B: Distribution of foreign listings across home countries by industry

Home country	MNG	MFC	TSP	TRD	FIN	SVC	ADM	Total
Arab Emirates					1			1
Australia	2	2	1					5
Belgium		1		1	3			5
Brazil	2	1	3					6
Canada	4	3	5		4	2		18
Chile					2			2
China			2					2
Colombia		1						1
Czech Republic			1					1
Finland		2						2
France	1	5	7	3	8			24
Germany		4	2		5	1	3	15
Greece		2	1					3
Hong Kong	1							1
Hungary		1						1
Iceland					1			1
India	2	12	2		3	1		20
Indonesia	1							1
Ireland		3	1			1		5
Italy		1	2		2			5
Japan		3	2		4	2		11
Kazakhstan					2			2
Korea		5		1	4			10
Liechtenstein					1			1
Luxembourg		4	2					6
Mexico			2					2
Netherlands		9	1		2	1		13
New Zealand		1	1					2
Norway		1						1
Portugal					1			1
Qatar					1			1
Russia		1	1		1			3
Singapore		1			2			3
Spain			1		2			3
Sweden			4					4
Switzerland	1	2			1			4
Taiwan		9			2			11
Ukraine			1					1
United Kingdom	4	4	2	1	11	1		23
United States	3	11			4	2		20
Total	21	89	44	6	67	11	3	241

Table 1 (continued)

Panel C: Distribution of foreign listings across home countries by calendar year

Home country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Arab Emirates										1		1
Australia	1	1	1		1						1	5
Belgium	2				1		1		1			5
Brazil		1					1	1	2	1		6
Canada	6	3	1		1	2	1	1	1		2	18
Chile		2										2
China		1		1								2
Colombia								1				1
Czech Republic						1						1
Finland	1					1						2
France	7	2		1		7	5	2				24
Germany	4	1				5	4			1		15
Greece	2	1										3
Hong Kong	1											1
Hungary				1								1
Iceland		1										1
India	1		2	2	6	4			4	1		20
Indonesia					1							1
Ireland	1	2				1	1					5
Italy	2		2							1		5
Japan	3	3			1	2				1	1	11
Kazakhstan										1	1	2
Korea	1	1	5	1	1	1						10
Liechtenstein							1					1
Luxembourg		3		1	1	1						6
Mexico	1							1				2
Netherlands	2				1	4	2			3	1	13
New Zealand	1										1	2
Norway	1											1
Portugal	1											1
Qatar								1				1
Russia					1	1					1	3
Singapore		1							1		1	3
Spain						3						3
Sweden	2	2										4
Switzerland	2						1		1			4
Taiwan		2	5	1	1				1	1		11
Ukraine										1		1
United Kingdom	4	1	6	1	3	2	3		1	2		23
United States	7	3	1	1	2		1	2	2		1	20
Total	53	31	23	10	21	35	21	9	14	14	10	241

This table provides the distribution of cross-listed firms from 2001 to 2011 that have traded CDS contracts. Panel A shows cross-listings across home and host countries (denoted with two-digit country codes); Panel B – by home country and industry, classified based on their one-digit SIC codes; Panel C – by home country and listing year. MNG stands for Mining and Construction, MFC – Manufacturing, TSP – Transportation, TRD – Wholesale & Retail Trade, FIN – Finance, Insurance & Real Estate, SVC – Services, ADM – Public Administration. The cross-listing data are from the Sarkissian and Schill public foreign listing database and listing information from stock exchanges of each country. The firms with cross-listings are matched with the Markit CDS database to ensure the availability of CDS contracts.

Table 2. Chronology of CDS trading relative to cross-listing event

	CDS initiation relative to the cross-listing month			
Home country	Before three months	After three months	Within ± three months	Total
Arab Emirates	1			1
Australia	1	3	1	5
Belgium	5	3		8
Brazil	4	2		6
Canada	11	8	1	20
Chile	2			2
China	2			2
Colombia	1			1
Czech Republic		1		1
Finland	1	1		2
France	9	15	5	29
Germany	2	12	2	16
Greece	2	1		3
Hong Kong	1			1
Hungary	1			1
Iceland	2			2
India	14	5	1	20
Indonesia	1			1
Ireland	5	1	1	7
Italy	4	3	2	9
Japan	4	6	1	11
Kazakhstan		2		2
Korea	6	4		10
Liechtenstein	1			1
Luxembourg	3	2	2	7
Mexico	1	1		2
Netherlands	3	13		16
New Zealand	1		1	2
Norway	1		1	2
Portugal		1		1
Qatar		1		1
Russia	1	2		3
Singapore	2	2		4
Spain	1	2		3
Sweden	2	2		4
Switzerland	4	1	1	6
Taiwan	3	6	2	11
Ukraine		1		1
United Kingdom	15	12	3	30
United States	12	10	2	24
Total	129	123	26	278

This table reports statistics on the timing of introduction of trading in the firm's CDS securities relative to the firm's cross-listing event. The sample period of cross-listing events runs from 2001 until 2011, for CDS – from 2001 to 2013.

Table 3. Summary statistics

Panel A: Descriptive statistics of CDS and equity returns

		CDS Spread		CDS Depth		CDS Return		Equity Return			
Home country	Obs.	Mean	SD	Mean	SD	Mean	SD	Mean	SD	ρ	Stale
Arab Emirates	382	1.767	0.404	2.000	0.000	0.044	11.942	0.148	1.499	-0.02	0.00
Australia	5,135	0.623	0.398	6.401	3.520	-0.006	4.485	0.082	2.285	-0.08	0.30
Belgium	4,277	1.222	0.996	4.411	2.090	0.029	4.621	-0.032	3.538	-0.22	0.21
Brazil	5,991	2.015	0.837	3.911	2.551	0.018	5.950	-0.018	2.588	-0.16	0.03
Canada	17,166	1.732	1.858	6.602	4.035	-0.022	6.022	0.043	2.229	-0.02	0.19
Chile	1,708	1.175	0.340	2.000	0.000	-0.035	5.651	0.043	2.970	-0.01	0.02
China	681	4.843	1.374	2.040	0.195	0.030	2.025	-0.110	1.985	-0.02	0.04
Colombia	25	1.945	0.227	2.000	0.000	5.680	20.291	-0.452	1.316	-0.40	0.00
Czech Republic	2,702	0.808	0.395	2.665	0.817	0.071	6.020	0.092	2.230	-0.06	0.46
Finland	6,776	1.458	2.294	6.656	2.470	0.005	4.215	-0.048	3.044	-0.26	0.12
France	50,976	1.211	1.888	6.624	2.944	0.004	4.864	-0.002	2.613	-0.27	0.13
Germany	39,563	0.582	0.484	7.044	2.748	-0.002	4.685	0.025	3.249	-0.14	0.13
Greece	1,928	0.341	0.090	2.074	0.261	-0.098	5.646	0.011	2.945	0.00	0.33
Hong Kong	2,980	0.708	0.509	7.421	2.845	0.024	3.804	0.065	2.470	-0.36	0.11
Hungary	711	4.329	1.227	2.190	0.420	0.040	8.802	-0.023	2.720	-0.01	0.00
Iceland	866	2.355	3.883	10.151	4.909	0.619	6.009	-0.021	2.089	-0.33	0.11
India	22,584	5.295	5.464	3.693	1.890	0.064	5.987	-0.013	3.229	-0.07	0.27
Indonesia	1,216	7.341	5.795	2.034	0.181	0.196	11.973	-0.040	3.588	-0.02	0.56
Ireland	9,186	2.803	2.521	4.485	1.846	0.014	4.181	0.022	2.117	-0.05	0.09
Italy	8,892	3.185	4.962	7.525	3.131	0.024	4.154	-0.054	2.839	-0.21	0.08
Japan	14,536	0.596	0.893	5.236	2.479	-0.029	6.546	-0.040	2.462	-0.08	0.27
Kazakhstan	818	21.848	21.551	2.747	0.960	0.687	16.485	-0.084	5.250	0.05	0.20
Korea	15,014	1.343	1.328	6.597	3.652	-0.029	5.530	0.042	2.595	-0.20	0.08
Liechtenstein	112	0.871	0.350	2.536	0.879	0.835	8.498	0.063	5.493	-0.02	0.30
Luxembourg	5,300	1.069	1.260	6.447	2.860	-0.004	5.020	0.031	1.762	-0.01	0.12
Mexico	1,844	1.304	1.094	5.451	3.285	-0.190	4.088	0.083	1.794	-0.22	0.21
Netherlands	15,980	0.686	0.707	5.758	2.805	0.009	6.111	0.003	2.706	-0.13	0.17
New Zealand	517	1.361	0.603	4.319	1.533	-0.137	6.647	-0.013	1.978	-0.05	0.22
Norway	2,646	0.387	0.247	6.290	2.708	0.003	4.504	0.056	1.921	-0.07	0.21
Portugal	2,871	2.229	4.088	5.507	2.919	0.096	6.913	-0.105	2.397	-0.16	0.19
Qatar	1,576	1.783	0.528	2.661	0.566	0.017	4.610	-0.032	2.268	-0.07	0.12
Russia	5,571	3.492	3.336	4.541	2.442	0.022	4.689	0.027	3.379	-0.28	0.05
Singapore	4,957	1.467	1.241	3.484	1.632	0.040	8.737	0.049	1.789	-0.06	0.10
Spain	6,729	1.352	1.132	6.480	2.583	0.006	5.125	-0.008	2.280	-0.32	0.12
Sweden	9,156	1.759	2.168	5.584	2.439	-0.008	3.636	0.011	2.489	-0.17	0.17
Switzerland	8,478	1.246	2.205	5.109	2.756	-0.003	4.668	0.018	3.133	-0.21	0.17
Taiwan	8,830	1.621	1.137	3.145	2.014	-0.025	4.374	-0.016	2.703	-0.04	0.51
Ukraine	410	5.067	1.874	2.166	0.372	0.316	7.320	-0.045	3.833	-0.02	0.67
United Kingdom	44,025	0.875	1.338	5.237	2.645	-0.003	5.484	0.018	2.755	-0.13	0.18
United States	36,456	1.862	9.681	7.079	4.304	0.026	5.220	-0.018	2.685	-0.14	0.16
Total	369,571	1.639	4.143	5.801	3.224	0.010	5.391	0.005	2.750	-0.14	0.17

Table 3 (continued)

Panel B: Descriptive statistics of firm characteristics

	Market Cap		ROA		Leverage		P/B		Analysts	
Home country	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Arab Emirates	2.95	0.85	0.012	0.001	0.041	0.01	0.837	0.228	3.4	0.6
Australia	5.34	3.95	0.209	0.196	0.153	0.063	3.267	1.267	10.1	2.6
Belgium	19.24	14.78	0.016	0.021	0.215	0.124	1.116	0.503	20.8	3.9
Brazil	52.55	63.63	0.025	0.073	0.282	0.084	1.273	1.185	7.9	2.7
Canada	19.21	16.44	0.043	0.055	0.294	0.148	3.260	8.770	9.6	4.9
Chile	12.48	2.28	0.019	0.002	0.199	0.014	3.074	0.340	5.3	2.3
China	10.28	6.58	0.034	0.019	0.522	0.049	1.095	0.561	21.7	2.5
Colombia	82.54	12.08	0.101	0.009	0.164	0.013	2.106	0.328	4.9	0.3
Czech Republic	21.26	10.93	0.070	0.026	0.219	0.075	1.909	1.055	13.9	7.3
Finland	65.48	36.36	0.084	0.090	0.089	0.078	3.941	2.433	44.2	4.8
France	40.58	30.96	0.014	0.044	0.232	0.109	0.887	8.001	26.2	5.8
Germany	54.54	26.38	0.028	0.041	0.239	0.131	1.709	1.087	32.7	6.4
Greece	9.69	3.83	0.054	0.016	0.328	0.039	2.334	0.799	0.0	0.0
Hong Kong	57.56	31.07	0.166	0.036	0.120	0.045	2.640	0.734	25.5	4.0
Hungary	10.41	1.23	0.022	0.012	0.238	0.021	0.853	0.134	16.1	2.0
Iceland	9.48	1.33	0.018	0.004	0.643	0.030	2.038	0.282	3.2	1.3
India	8.87	8.96	0.031	0.033	0.383	0.138	2.503	1.468	13.7	11.8
Indonesia	0.61	0.29	0.037	0.053	0.408	0.040	0.705	0.324	6.0	2.4
Ireland	14.24	7.64	0.079	0.182	0.223	0.111	3.853	2.035	20.9	4.2
Italy	26.97	21.69	-0.002	0.048	0.533	0.094	1.347	1.031	12.3	4.2
Japan	52.17	38.24	0.034	0.072	0.130	0.077	1.824	0.995	16.1	5.7
Kazakhstan	1.45	0.46	0.010	0.002	0.021	0.010	1.453	0.316	7.2	3.3
Korea	12.29	9.49	0.064	0.058	0.234	0.163	1.232	0.704	13.3	14.5
Liechtenstein	2.46	0.84	0.008	0.002	0.139	0.002	1.311	0.447	4.8	0.4
Luxembourg	33.13	35.73	0.093	0.082	0.280	0.091	2.687	2.053	6.8	5.3
Mexico	34.92	20.00	0.120	0.014	0.362	0.034	4.084	1.949	8.0	7.9
Netherlands	35.66	20.49	0.028	0.046	0.166	0.133	1.915	1.473	29.8	7.8
New Zealand	0.63	0.22	0.054	0.004	0.567	0.017	1.327	0.582	9.7	0.5
Norway	56.40	26.39	0.087	0.023	0.153	0.031	2.199	0.577	28.0	7.0
Portugal	6.85	1.86	0.006	0.002	0.240	0.007	2.006	0.718	12.4	2.5
Qatar	4.99	0.72	0.024	0.005	0.269	0.023	1.416	0.413	9.5	3.6
Russia	61.05	40.03	0.038	0.033	0.242	0.109	1.350	0.888	6.9	5.5
Singapore	14.81	8.90	0.057	0.073	0.082	0.081	1.767	1.252	16.3	5.4
Spain	71.45	40.08	0.026	0.034	0.407	0.100	2.137	1.143	32.5	6.4
Sweden	17.55	13.37	0.042	0.044	0.277	0.111	1.325	0.391	21.4	8.3
Switzerland	34.56	19.40	0.032	0.039	0.296	0.171	2.196	1.383	25.5	6.8
Taiwan	7.12	6.43	0.006	0.078	0.228	0.158	1.641	0.937	10.9	7.6
Ukraine	15.06	8.13	0.062	0.027	0.479	0.090	2.758	1.443	1.3	0.4
United Kingdom	65.40	79.83	0.040	0.060	0.178	0.153	1.706	1.919	15.0	7.2
United States	96.85	93.75	0.064	0.080	0.254	0.130	2.148	7.293	21.1	10.5
Total	28.73	19.14	0.039	0.070	0.243	0.151	2.620	6.451	20.8	11.3

Table 3 (continued)

This table shows the mean and standard deviation of firm CDS spread level and returns, equity returns, and of four firm characteristics for trades in each host country of cross-listing in the sample. The sample period is 2001-2013. CDS Spread is the firm's five-year CDS spread. CDS coverage denotes the number of dealer quotes used in the computation of the five-year mid-market spread. Both these variables are from Markit. Firm returns (in percent) are from Datastream. ρ is the Pearson correlation coefficient between equity and CDS returns. Stale is the proportion of stale quotes among five-year CDS contracts. Firms' financial accounting information is from Compustat Global. Market Cap is the market capitalization in billion U.S. dollars, ROA is the return on assets, Leverage is the long-term debt divided by the sum of long-term debt and market value of equity, P/B is the price-to-book ratio. Analysts is the number of analysts covering a firm from I/B/E/S database.

Table 4. Impact of cross-listing on CDS and stock returns co-movement

	Full Sample				Sub-samples			
	(1)	(2)	(3)	(4)	2001-2007	2008-2013	US Host	Non-US Host
$R_{i,t}$	-0.125***	-0.054***	-0.055***	-0.055***	-0.040**	-0.123***	-0.086***	-0.047**
	(4.17)	(2.80)	(2.80)	(2.80)	(2.08)	(3.51)	(2.90)	(2.12)
$R_{i,t-1}$	-0.088***	-0.083***	-0.080***	-0.080***	-0.079***	-0.085***	-0.045	-0.090***
	(4.67)	(4.31)	(4.28)	(4.28)	(3.36)	(3.81)	(1.43)	(3.94)
$CL \times R_{it}$	-0.206***	-0.154***	-0.153***	-0.153***	-0.069**	-0.108***	-0.064*	-0.187***
	(5.73)	(5.31)	(5.25)	(5.25)	(2.53)	(2.60)	(1.71)	(5.28)
$CL \times R_{i,t-1}$	-0.040**	-0.041**	-0.041**	-0.041**	-0.027	-0.044**	-0.046	-0.045*
	(2.13)	(2.01)	(2.05)	(2.05)	(0.96)	(2.01)	(1.60)	(1.82)
$CDS_{i,t-1}$	-0.043***	-0.042***	-0.044***	-0.044***	-0.038***	-0.051***	-0.036***	-0.049***
	(4.33)	(3.80)	(3.91)	(3.91)	(2.79)	(3.52)	(2.80)	(3.41)
CL	0.067***	0.072*	0.074*	0.075*	0.028***	-0.017*	0.083*	0.080*
	(3.40)	(1.65)	(1.72)	(1.73)	(2.85)	(1.67)	(1.94)	(1.79)
$R_{w,t}$		-0.636***	-0.604***	-0.604***	-0.483***	-0.606***	-0.574***	-0.617***
		(12.84)	(12.51)	(12.50)	(6.66)	(10.09)	(9.02)	(11.35)
$R_{c,t}$		-0.262***	-0.259***	-0.259***	-0.213***	-0.299***	-0.268***	-0.257***
		(8.08)	(8.04)	(8.04)	(6.39)	(6.62)	(7.14)	(6.18)
ΔVIX_t		-0.012	-0.010	-0.010	-0.011	-0.049	-0.0924	-0.0110
		(1.53)	(1.30)	(1.30)	(0.98)	(0.44)	(1.08)	(1.31)
ΔDS_t			0.145***	0.145***	0.117***	0.165***	0.142***	0.147***
			(5.92)	(5.92)	(2.88)	(5.90)	(5.08)	(5.72)
ΔTS_t			0.078	0.079	0.011	-0.052	0.016	0.040
			(0.41)	(0.42)	(0.63)	(0.30)	(0.87)	(0.20)
$ROA_{i,t}$				0.014	-0.033	0.041	0.033	-0.031
				(0.72)	(1.40)	(1.46)	(1.36)	(0.11)
$Leverage_{i,t}$				-0.041	0.017	-0.012	-0.025	0.0147
				(0.34)	(0.83)	(0.49)	(1.17)	(0.10)
$P/B_{i,t}$				0.012	-0.053	0.034	0.053**	-0.026**
				(0.61)	(0.53)	(1.49)	(2.56)	(2.35)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	367,214	367,214	367,214	367,214	176,703	190,511	113,535	253,679
R^2	0.036	0.053	0.056	0.056	0.019	0.087	0.050	0.060

Table 4 (continued)

This table shows the impact of cross-listings on the co-movement of a firm's CDS and stock returns. The sample period is 2001-2013 and the data is daily. The dependent variable is the CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return of firm i at date t. CL is a dummy variable which equals one after cross-listing and zero otherwise. $R_{w,t}$ is the MSCI world index return, $R_{c,t}$ is the residuals from a regression of the home market MSCI country index returns on the world index returns. VIX is the CBOE volatility index, ΔDS is the daily change in the default spread on corporate bonds (BAA-AAA), ΔTS is the daily change in the term spread, which is the difference between 10-year T-bonds and three-month T-bills, ROA is the return on assets, Leverage is the long-term debt divided by the sum of long-term debt and market value of equity, P/B is the price-to-book ratio. CDS returns are from Markit. Firm and equity market returns are from Datastream. Firms' accounting information is from Compustat Global. Data for the term and default spreads are from the Federal Reserve. Each regression includes firm fixed effects, Firm FE, and a constant, which is not shown. The standard errors are clustered by firm and time. The absolute t-statistics are in parentheses. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 5. Summary statistics of characteristics for firms with and without cross-listings

	# Firms		Leverage	ρ(CDS, R)	Credit Rating	Market Cap
Cross-listed Firms	241	Mean	0.266	-0.070	BBB	9.408
		SD	0.165	0.178	[B, AA+]	1.631
Matched Firms	202	Mean	0.274	-0.075	BBB	9.419
		SD	0.148	0.155	[B+, AA+]	1.641
Difference (CL - MT)			-0.008	0.005	0.41	-0.011
			(1.01)	(0.40)	(1.22)	(1.06)

This table reports the summary statistics of firm characteristics for cross-listed firms and the matched sample of non-cross-listed firms. All firms must have traded CDS contracts and stock price information. The sample period is 2001-2013. Accounting information is from Compustat for U.S. firms and from Compustat Global for non-U.S. firms. All reported firm characteristics are collected at the end of each year in USD and averaged across firms. Leverage is the long-term debt divided by the sum of long-term debt and market value of equity. ρ(CDS, R) is the Pearson correlation coefficient between firm CDS and stock returns. Credit Rating is the S&P long-term Credit Rating from Compustat RatingsXpress, which we map into a numerical scale ranging from AAA = 1 to C = 21. In addition to the average rating in each group, we report the range of ratings below in square brackets. Market Cap is the natural logarithm of firms' total dollar market value of all outstanding common shares. SD is the standard deviation. The matched sample is constructed using a Euclidean distance-based matching approach as follows. We compute the normalized Euclidean distance between the cross-listed and a set of non-cross-listed firms using a set of demeaned and standardized firm characteristics. The covariates used in the Euclidean distance matching procedure include the leverage ratio, ρ(CDS, R), a firm's credit rating, and its market capitalization. We also impose the restriction that non-cross-listed firms must come from the same geographical region as the cross-listed firms. We classify all countries into 6 regions following the United Nations geoscheme, i.e., North America, Latin America and the Caribbean, Europe, Africa, Asia, and Oceania. Each matching firm is chosen based on the first best match, i.e., the firm with the closest Euclidean distance to the cross-listed firm, and we match with replacement, using the firm characteristics corresponding to the year immediately prior to the year of the actual cross-listing date. The universe of matching candidates comprises 2,016 non-cross-listed firms. For the matched firms, we set a pseudo cross-listing date identical to the corresponding cross-listed firm. Difference (CL - MT) is the paired difference test in means between cross-listed and matched firms. The absolute t-statistics are in parentheses.

Table 6. Impact of cross-listing on CDS and stock returns co-movement for cross-listed and matched firms

	Matched	Cross-listed	DID	Matched	Cross-listed	DID
	(1)	(2)	(3)	(4)	(5)	(6)
$R_{i,t}$	-0.124***	-0.125***	-0.123***	-0.079***	-0.055***	-0.076***
	(-6.96)	(-4.17)	(-6.97)	(-3.95)	(2.80)	(-3.90)
$R_{i,t-1}$	-0.101***	-0.088***	-0.099***	-0.070***	-0.080***	-0.066***
	(-7.70)	(-4.67)	(-7.72)	(-4.32)	(-4.28)	(-4.26)
$CL \times R_{it}$	-0.029	-0.206***	-0.029	-0.009	-0.153***	-0.008
	(-0.66)	(-5.73)	(-0.66)	(-0.26)	(-5.25)	(-0.25)
$CL \times R_{i,t-1}$	-0.009	-0.040**	-0.008	-0.010	-0.041**	-0.010
	(-0.32)	(-2.13)	(-0.30)	(-0.37)	(-2.05)	(-0.37)
$CDS_{i,t-1}$	-0.078***	-0.043***	-0.057***	-0.089***	-0.044***	-0.058***
	(-5.62)	(-4.33)	(-6.64)	(-5.45)	(-3.91)	(-5.53)
CL	0.058***	0.067***	0.067***	0.052	0.075*	0.071**
	(3.33)	(3.40)	(5.67)	(1.62)	(1.73)	(2.05)
$D \times R_{i,t}$			-0.003			0.029
			(-0.09)			(0.98)
$D \times R_{i,t-1}$			0.008			-0.023
			(0.29)			(-0.69)
$D \times CL \times R_{it}$			-0.176***			-0.170***
			(-2.77)			(-3.58)
$D \times CL \times R_{i,t-1}$			-0.034			-0.030
			(-0.94)			(-0.76)
D			-0.047			-0.002
			(-0.41)			(-0.00)
Controls	No	No	No	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	286,986	367,214	654,200	286,986	367,214	654,200
R^2	0.017	0.036	0.027	0.038	0.056	0.048

This table shows the impact of cross-listing on the co-movement of a firm's CDS and stock returns for cross-listed firms and matched non-cross-listed firms. The sample period is 2001-2013. The matched sample is constructed using a Euclidean distance-based matching algorithm, as describe in the caption of Table 5. For the matched firms, we set a pseudo cross-listing date identical to the corresponding cross-listed firm. The dependent variable is the daily CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return for firm *i* at date *t*. CL is a dummy variable which equals one after foreign listing and zero otherwise. D is a dummy variable which equals one for cross-listed firms and zero for matched firms. All control variables are as in the specification of Table 4, but their estimates are not reported. CDS returns are from Markit. Firm and equity market returns are from Datastream and CRSP, respectively. Firms' financial accounting information is from Compustat Global. DID are the estimates of the Difference-in-Difference tests. Each regression includes firm fixed effects, Firm FE, and a constant, which is not shown. The standard errors are clustered by firm and time. The absolute t-statistics are in parentheses. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels.

Table 7. Analyst coverage and CDS coverage before and after cross-listing

	Before Cross-listing	After Cross-listing	Diff (After-Before)
Analysts	17.08	19.79	2.71***
			(5.06)
CDS coverage	5.17	5.69	0.52**
			(2.09)

This table shows the changes in the number of analysts and the CDS coverage measure before and after the cross-listing event. The sample period is 2001-2013 and the data frequency is daily. For each firm, we compute the average analyst coverage and CDS coverage before and after cross-listing. We require that the analyst coverage and CDS coverage information are available both before and after the cross-listing events. The last column of the table reports the difference in each of the two measures between the two periods, Diff (After-Before), and the corresponding absolute t-statistic. Both variables are defined in Table 3. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 8. Impact of cross-listing on CDS and stock returns co-movement by firm visibility characteristics

	Market Cap		Credit Quality		Δ CDS Depth		Δ Analysts	
	High	Low	High	Low	High	Low	High	Low
$R_{i,t}$	-0.023	-0.104***	-0.011	-0.097***	-0.039*	-0.086***	-0.011	-0.115***
	(1.05)	(4.64)	(0.63)	(4.01)	(1.85)	(2.89)	(0.74)	(4.06)
$R_{i,t-1}$	-0.069***	-0.096***	-0.053**	-0.106***	-0.065***	-0.101***	-0.076***	-0.084***
	(3.00)	(3.43)	(2.31)	(4.51)	(3.17)	(4.14)	(2.73)	(3.47)
$CL \times R_{it}$	-0.258***	-0.027	-0.236***	-0.086**	-0.269***	-0.025	-0.252***	-0.008
	(6.45)	(1.02)	(5.95)	(2.54)	(6.73)	(0.72)	(7.32)	(0.25)
$CL \times R_{i,t-1}$	-0.066**	-0.003	-0.093***	-0.001	-0.062***	0.005	-0.063**	-0.003
	(2.46)	(0.12)	(3.48)	(0.03)	(2.65)	(0.21)	(1.99)	(0.15)
$CDS_{i,t-1}$	-0.009	-0.076***	-0.045**	-0.044***	0.023**	-0.091***	-0.027	-0.061***
	(0.69)	(5.16)	(2.56)	(3.58)	(2.10)	(7.03)	(1.45)	(5.25)
CL	0.093*	0.021	0.118**	0.033	0.096*	0.016	0.122**	-0.204
	(1.84)	(0.45)	(2.24)	(0.74)	(1.94)	(0.33)	(2.20)	(0.45)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$CL \times R_{it}$ (High-Low)	-0.253***		-0.135***		-0.280***		-0.245***	
	(5.28)		(2.62)		(5.28)		(5.13)	
$CL \times R_{it-1}$ (High-Low)	0.076**		-0.093***		-0.115***		-0.067*	
	(2.06)		(2.83)		(3.42)		(1.73)	
Obs.	195,502	171,712	188,711	178,503	199,449	167,765	206,633	160,581
R^2	0.086	0.037	0.057	0.057	0.120	0.031	0.085	0.034

This table shows the impact of cross-listing on the co-movement of a firm's CDS and stock returns for four subsamples classified according to firm visibility characteristics. The sample period is 2001-2013. The dependent variable is the daily CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return for firm *i* at date *t*. CL is a dummy variable which equals one after foreign listing and zero otherwise. All control variables, including firm fixed effects, are as in Table 4. CDS returns are from Markit. Firm and equity market returns are from Datastream. Firms' financial accounting information is from Compustat Global. Market Cap and Credit Quality are the market capitalization and the average quoted five-year CDS, respectively, for each firm over the sample period. ΔCDS coverage equals the average CDS coverage after cross-listing minus that before cross-listing, where CDS coverage is the number of dealer quotes used in the computation of the mid-market five-year CDS spread, sourced from Markit. ΔAnalyst is the number of analysts covering a firm after cross-listing minus that before cross-listing, and their numbers come from I/B/E/S database. All firm characteristic samples are split at the median. The standard errors are clustered by firm and time. The absolute t-statistics are in parentheses. $CL \times R_{it}$ (High-Low) and $CL \times R_{it-1}$ (High-Low) are the estimates of Difference-in-Difference (DID) tests. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 9. Impact of cross-listing on CDS and equity co-movement by cross-country closeness characteristics

	Geographic Proximity		Cross-Country Correlation	
	High	Low	High	Low
$R_{i,t}$	-0.017 (0.92)	-0.115*** (3.93)	-0.014 (0.88)	-0.118*** (3.93)
$R_{i,t-1}$	-0.075*** (2.96)	-0.084*** (3.26)	-0.072*** (2.93)	-0.090*** (3.44)
$CL \times R_{it}$	-0.234*** (6.10)	-0.052 (1.42)	-0.230*** (6.13)	-0.051 (1.38)
$CL \times R_{i,t-1}$	-0.068** (2.40)	-0.014 (0.58)	-0.082*** (2.97)	0.003 (0.16)
$CDS_{i,t-1}$	-0.025* (1.96)	-0.059*** (3.84)	-0.019 (1.62)	-0.066*** (4.24)
CL	0.119** (2.37)	-0.038 (0.82)	0.102* (1.92)	0.012 (0.29)
Controls	Yes	Yes	Yes	Yes
$CL \times R_{it}$ (High-Low)	-0.211*** (3.97)		-0.196*** (3.96)	
$CL \times R_{it-1}$ (High-Low)	-0.068* (1.84)		-0.096*** (2.66)	
Obs.	193,150	174,064	195,795	171,419
R^2	0.071	0.046	0.074	0.043

This table shows the impact of cross-listing on the co-movement of a firm's CDS and stock returns for two subsamples classified according to cross-country closeness characteristics. The sample period is 2001-2013. The dependent variable is the daily CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return for firm *i* at date *t*. CL is a dummy variable which equals one after a foreign listing and zero otherwise. All control variables, including firm fixed effects, are as in Table 5, but their estimates are not reported. Each regression includes a constant, which is not shown. CDS returns are from Markit. Firm and equity market returns are from Datastream. Geographic Proximity is the great circle distance between the capital cities of the home and host markets for cross-listings. Cross-Country Correlation is the average correlation of returns on market indices between home and host markets of cross-listed firms. Both of these two proximity measures are computed according to Sarkissian and Schill (2004). Cross-country characteristic samples are split at the median. The standard errors are clustered by firm and date. The absolute t-statistics are in parentheses. $CL \times R_{it}$ (High-Low) and $CL \times R_{it-1}$ (High-Low) are the estimates of Difference-in-Difference (DID) tests. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 10. Pricing discrepancies before and after cross-listing

Panel A: Full sample of firms

		Before Cross-listing		After Cross-listing			
	Interval (τ)	Mean	SD	Mean	SD	Diff (After-Before)	t-stat
	1	0.337	0.148	0.509	0.122	0.171***	7.88
	5	0.487	0.131	0.600	0.104	0.119***	5.97
I(ΔCDS×ΔP < 0)	10	0.553	0.136	0.610	0.102	0.057***	2.98
	25	0.578	0.166	0.639	0.135	0.061**	2.52
	50	0.660	0.229	0.652	0.149	-0.008	0.26
	1	0.385	0.251	0.136	0.166	-0.249***	7.37
	5	0.132	0.170	0.045	0.105	-0.087***	2.62
I(ΔCDS×ΔP = 0)	10	0.070	0.131	0.028	0.091	-0.041**	2.33
	25	0.026	0.077	0.016	0.069	0.010	0.85
	50	0.015	0.052	0.011	0.062	0.003	0.42
	1	0.276	0.111	0.355	0.067	0.079***	5.38
	5	0.378	0.084	0.354	0.068	-0.023*	1.91
I(ΔCDS×ΔP > 0)	10	0.373	0.100	0.361	0.081	-0.012	0.85
	25	0.391	0.147	0.344	0.130	-0.046*	2.09
	50	0.336	0.234	0.323	0.144	-0.013	0.41

Panel B: Firms with at least one year stock and CDS returns before and after cross-listing

		Before Cross-listing		After Cross-listing			
	Interval (τ)	Mean	SD	Mean	SD	Diff (After-Before)	t-stat
	1	0.336	0.166	0.431	0.182	0.095***	4.65
	5	0.487	0.178	0.528	0.173	0.041**	1.97
I(ΔCDS×ΔP < 0)	10	0.548	0.174	0.568	0.169	0.020	0.96
	25	0.579	0.188	0.593	0.169	0.013	0.59
	50	0.644	0.242	0.645	0.183	0.001	0.05
	1	0.391	0.266	0.261	0.289	-0.130***	3.87
	5	0.142	0.195	0.133	0.239	-0.009	1.10
I(ΔCDS×ΔP = 0)	10	0.081	0.161	0.097	0.208	0.016	0.75
	25	0.036	0.107	0.062	0.169	0.026	1.42
	50	0.020	0.083	0.040	0.137	0.020	1.38
	1	0.273	0.130	0.308	0.126	0.035*	2.30
	5	0.364	0.149	0.336	0.119	-0.028*	1.80
I(ΔCDS×ΔP > 0)	10	0.345	0.130	0.351	0.133	0.006	0.81
	25	0.378	0.169	0.342	0.148	-0.036*	1.93
	50	0.334	0.240	0.312	0.169	-0.022	1.41

Table 10 (continued)

Panel C: Market integration measure before and after cross-listing

		Before Cross-listing		After Cross-listing			
	Interval (τ)	Mean	SD	Mean	SD	Diff (After-Before)	t-stat
Cross-listings	1	-0.055	0.131	-0.161	0.112	-0.106***	6.29
	5	-0.096	0.150	-0.225	0.166	-0.131***	6.78
	10	-0.152	0.215	-0.260	0.163	-0.108***	4.14
	25	-0.245	0.254	-0.279	0.184	-0.034	1.04
	50	-0.284	0.259	-0.302	0.190	-0.018	1.25
Matched Sample	1	-0.051	0.081	-0.100	0.082	-0.049***	3.76
	5	-0.073	0.123	-0.143	0.126	-0.070***	4.41
	10	-0.074	0.224	-0.159	0.149	-0.085***	3.19
	25	-0.251	0.237	-0.238	0.199	0.013	1.28
	50	-0.264	0.182	-0.282	0.275	-0.018	0.98
DID Test	1					-0.057***	3.06
	5					-0.061**	2.34
	10					-0.023	0.63
	25					-0.047	0.84
	50					-0.001	0.31

This table reports the following Kapadia and Pu (2012) tests before and after cross-listing. Panels A and B show the means and standard deviations of pricing discrepancies between stock prices and CDS spreads before and after cross-listing, while Panel C – the Kendall's tau correlation measure before and after cross-listing. The pricing discrepancy measure depends on the concordance of changes in CDS spread and stock returns: $I\left(\Delta CDS_{i,k}^{\tau} \times \Delta P_{i,k}^{\tau} > 0\right)$. Here I is an indicator function, P_i and CDS_i are the stock price and CDS spread of firm i, $\Delta CDS_{i,k}^{\tau} = CDS_i(k+\tau) - CDS_i(k)$, $\Delta P_{i,k}^{\tau} = P_i(k+\tau) - P_i(k)$, and $\tau = [1, 5, 10, 25, 50]$ corresponds to the number of days in the trading interval. The equity and CDS markets are aligned if $I(\Delta CDS \times \Delta P < 0)$; they are neither aligned nor misaligned if $I(\Delta CDS \times \Delta P = 0)$. All pricing discrepancy measures are computed over non-overlapping time intervals. The Kendall's tau correlation measure is computed based on the integration measure as $\hat{\kappa}_i = 4\kappa_i / M(M-1) - 1$, where the integration measure is defined as:

$$\kappa_i = \sum_{k=1}^{M-\tau} I\left[\Delta CDS_{i,k}^{\tau} \times \Delta P_{i,k}^{\tau} > 0\right].$$

The sample period is 2001-2013. The daily quotes of CDS spreads are from Markit. The daily stock prices are from Datastream. The last two columns of the table report the differences in pricing discrepancies before and after cross-listing, Diff (After-Before), and the corresponding absolute t-statistic. Panel A uses the full firm sample, Panels B and C use only firms with at least one year of stock and CDS returns before and after the cross-listing event, and there are 79 such firms. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 11. Cross-market integration before and after cross-listing for cross-listed and matched firm samples

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CL	0.026**	0.027**	0.026**	0.024*	0.024*	0.026**	0.025**
	(2.04)	(2.15)	(2.05)	(1.91)	(1.91)	(2.05)	(2.02)
D×CL	-0.049***	-0.051***	-0.049***	-0.043**	-0.047***	-0.048***	-0.045***
	(2.84)	(3.00)	(2.87)	(2.53)	(2.76)	(2.85)	(2.69)
Leverage	-0.023	-0.018	-0.024	-0.018	-0.019	-0.021	-0.013
	(0.63)	(0.50)	(0.66)	(0.50)	(0.52)	(0.57)	(0.37)
EqVol	0.011	0.015	0.011	0.0667	0.053	-1.28	0.071
	(0.15)	(0.20)	(0.15)	(0.92)	(0.07)	(1.48)	(0.97)
MkCap	0.060	0.069	0.059	0.010	0.065	0.069	0.019
	(0.91)	(1.09)	(0.90)	(0.14)	(0.93)	(1.06)	(0.27)
ZeroSpread	-0.013						
	(0.09)						
DepthCDS		-0.070***					-0.071***
		(5.41)					(5.38)
ZeroRet			-0.028				
			(0.66)				
Amihud				0.011***			0.011***
				(3.67)			(3.71)
TrVol					0.034		
					(1.27)		
IVol						1.385	
						(1.60)	
Firm & Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	8,850	8,850	8,850	8,712	8,712	8,850	8,712
R^2	0.253	0.259	0.253	0.261	0.257	0.257	0.267

This table reports the results of the panel regression:

$$\bar{\kappa}_{i,t} = \alpha_i + \lambda_t + \beta_1 CL_{i,t} + \beta_2 D \times CL_{i,t} + \delta Firm\_Controls_{i,t} + \varepsilon_{i,t},$$

where the dependent variable is the transformed Kendall correlation, defined as $\bar{\kappa}_i = 0.5\ln\left((1+\hat{\kappa}_i)/(1-\hat{\kappa}_i)\right)$. CL is a dummy variable that equals one after cross-listing and zero otherwise. D is a dummy variable that equals one for a cross-listing and zero for a matched firm. Firm controls include seven firm-specific characteristics. Leverage is the leverage ratio. EqVol is the quarterly equity volatility. MkCap is the natural logarithm of the market capitalization. ZeroSpread is the proportion of trading days with stale returns in the five-year CDS Spread. DepthCDS is the number of dealers providing quotes for the computation of mid-market CDS spread. ZeroRet is the proportion of trading days with zero stock returns. Amihud is the Amihud (2002) illiquidity measure based on price impact and is computed as $ln\left((10^6 \times |r_t|)/(PRC_t \times Vol_t)\right)$, where PRC_t is the closing price of the stock, $|r_t|$ is the absolute value of the stock return, and Vol_t is the trading volume at time *t.* TrVol is the natural logarithm of the number of traded shares. IVol is the idiosyncratic volatility of the residuals from regressing firm-specific stock returns on the MSCI world index return and MSCI country index returns. The sample period is 2001-2013. All variables are measured at the quarterly frequency. Firm and quarterly time fixed effect are included in all specifications. Each regression includes a constant, which is not shown. The standard errors are clustered by firm. The absolute t-statistics are in parentheses. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively**.**

Table 12. World market integration tests

	Stock Market Factors			Stock and Bond Market Factors		
	Before	After	Diff (After-Before)	Before	After	Diff (After-Before)
Stock returns						
β_w	1.029	1.043	0.014 (0.22)	1.014	1.051	0.037 (0.48)
β_c	0.817	0.827	0.010 (0.18)	0.795	0.832	0.037 (0.74)
CDS returns						
β_w	-0.632	-0.902	-0.270** (2.52)	-0.650	-0.895	-0.245** (2.24)
β_c	-0.186	-0.285	-0.099 (0.78)	-0.184	-0.355	-0.171 (0.52)

This table shows world market integration tests on equity and CDS returns before and after cross-listing events using Model (5). It reports the average world market beta, β_W, and local country beta, β_c, before and after cross-listing, as well as the difference test, Diff (After-Before), for these estimates between the two periods with the corresponding absolute t-statistics. The sample period is 2001-2013. The model is estimated for each individual firm one year before and one year after the cross-listing event, excluding the event day. Only firms with at least one year of stock and CDS return before and after cross-listing are included in estimations, and there are 79 such firms. The first three columns of the table report the version of Model (5) that includes two stock market indices, the last three columns report the results for the full version of Model (5) that includes both stock and bond market factors. The dependent variable is the firm excess return or the firm CDS excess return. The two stock market factors are the excess returns on the world market equity index (MSCI World) and firm's local equity index, orthogonal to the world market. The two bond market factors are the term spread and default spread. The CDS return information is from Markit. The stock and bond market information is from Datastream. All returns are in U.S. dollars. The one-month T-bill rate is used as the risk-free rate. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 13. Robustness: DID results after controlling for liquidity

	Matched	Cross-listed	DID	Matched	Cross-listed	DID
	(1)	(2)	(3)	(4)	(5)	(6)
$R_{i,t}$	-0.079***	-0.045*	-0.076***	-0.079***	-0.044*	-0.076***
	(3.94)	(1.93)	(3.89)	(3.94)	(1.92)	(3.88)
$R_{i,t-1}$	-0.067***	-0.085***	-0.066***	-0.070***	-0.085***	-0.067***
	(4.32)	(2.91)	(4.24)	(4.31)	(2.90)	(4.23)
$CL \times R_{it}$	-0.010	-0.176***	-0.010	-0.010	-0.176***	-0.010
	(0.30)	(5.13)	(0.29)	(0.30)	(5.15)	(0.29)
$CL \times R_{i,t-1}$	-0.011	-0.0344	-0.010	-0.011	-0.035	-0.010
	(0.39)	(1.13)	(0.39)	(0.39)	(1.14)	(0.39)
$CDS_{i,t-1}$	-0.090***	-0.041***	-0.058***	-0.090***	-0.041***	-0.058***
	(5.48)	(3.35)	(5.47)	(5.47)	(3.33)	(5.46)
CL	0.137	0.488	0.275	0.427	0.989**	0.728**
	(0.00)	(1.23)	(0.86)	(1.36)	(2.32)	(2.10)
$IVol_{i,t}$	0.025***	0.003	0.006	0.022***	0.003	0.005
	(3.15)	(1.25)	(1.37)	(2.70)	(0.97)	(1.07)
$TrVol_{i,t}$	0.346***	0.209**	0.261***	0.579***	0.162	0.359*
	(4.29)	(2.36)	(3.82)	(3.01)	(0.68)	(1.80)
$ZeroSpread_{i,t}$	-0.002***	-0.002***	-0.002***			
	(3.22)	(3.67)	(3.97)			
$ZeroRet_{i,t}$	-0.003	-0.003*	-0.004*			
	(0.98)	(1.74)	(1.96)			
$DepthCDS_{i,t}$				0.194**	0.085	0.118**
				(2.38)	(1.31)	(1.96)
$Illiquidity_{i,t}$				-0.283	0.096	-0.087
				(1.26)	(0.37)	(0.38)
$D \times R_{i,t}$			0.0277			0.028
			(0.91)			(0.92)
$D \times R_{i,t-1}$			-0.023			-0.023
			(0.69)			(0.69)
$D \times CL \times R_{it}$			-0.171***			-0.172***
			(3.55)			(3.57)
$D \times CL \times R_{i,t-1}$			-0.028			-0.029
			(0.70)			(0.71)
D			0.001			0.057
			(0.00)			(0.00)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	210,587	328,545	539,132	210,587	328,545	539,132
R^2	0.039	0.059	0.049	0.039	0.059	0.049

Table 13 (continued)

This table shows our main regression results after controlling for equity and CDS market liquidity metrics. The sample period is 2001-2013. The matched sample is constructed using a Euclidean distance-based matching algorithm, as described in the caption of Table 5. For the matched firms, we set a pseudo cross-listing date identical to the corresponding cross-listed firm. The variables $CDS_{i,t}$. $R_{i,t,}$ CL, D are defined in Table 6. ZeroSpread is the proportion of trading days with stale returns in the five-year CDS Spread. DepthCDS is the number of dealers providing quotes for the computation of the mid-market CDS spread. ZeroRet is the proportion of trading days with zero stock returns. $Illiquidity_{i,t}$ is the Amihud (2002) illiquidity measure based on price impact. TrVol is the natural logarithm of the number of traded shares. IVol is the idiosyncratic volatility of the residuals from regressing firm-specific stock returns on the MSCI world index return and MSCI country index returns. All liquidity variables are measured at the monthly frequency. The coefficients for TrVol, DepthCDS, and Amihud are multiplied by 1,000. All other control variables in Table 6 are also included in all specifications. Each regression includes a constant, which is not shown. The absolute t-statistics are in parentheses. The standard errors are clustered by firm. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 14. Robustness: Bad controls and non-linearity

	(1)	(2)	(3)	(4)	(5)	(6)
$R_{i,t}$	-0.127***	-0.105***	-0.101***	-0.127***	-0.105***	-0.102***
	(3.15)	(2.94)	(2.89)	(3.18)	(2.97)	(2.91)
$R_{i,t-1}$	-0.090***	-0.071***	-0.069***	-0.090***	-0.071***	-0.069***
	(3.67)	(3.44)	(3.36)	(3.68)	(3.45)	(3.36)
$CL \times R_{it}$	-0.206***	-0.176***	-0.174***	-0.206***	-0.177***	-0.175***
	(4.45)	(4.22)	(4.23)	(4.48)	(4.23)	(4.23)
$CL \times R_{i,t-1}$	-0.039	-0.022	-0.023	-0.040*	-0.022	-0.023
	(1.63)	(1.07)	(1.14)	(1.66)	(1.11)	(1.17)
$CDS_{i,t-1}$	-0.045***	-0.070***	-0.080***	-0.045***	-0.070***	-0.080***
	(4.25)	(7.14)	(7.98)	(4.24)	(7.14)	(7.98)
CL	0.736***	0.058	-0.062	0.793***	0.109	-0.010
	(4.68)	(0.35)	(0.40)	(4.59)	(0.66)	(0.06)
$R_{i,t}^2$				-0.012	-0.015	-0.021
				(0.48)	(0.80)	(1.16)
$CL \times R_{it}^2$				-0.069	-0.072	-0.066
				(0.90)	(0.99)	(0.87)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	Yes	No	Yes	Yes
Country × Time FE	No	No	Yes	No	No	Yes
Obs.	367,085	367,085	367,085	367,085	367,085	367,085
R^2	0.036	0.076	0.081	0.036	0.076	0.081

This table shows the impact of cross-listings on the co-movement of a firm's CDS and stock returns. The dependent variable is the CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return of firm *i* at date *t*. CL is a dummy variable which equals one after cross-listing and zero otherwise. $R_{i,t}^2$ is the squared term of $R_{i,t}$. Time fixed effects are at the weekly frequency. Country × Time FE is the interaction of the home country and time fixed effects. Each regression includes firm fixed effects and a constant, which is not shown. The standard errors are clustered by firm. The absolute t-statistics are in parentheses. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 15. Robustness: Main regression with leads and lags

	Cross-listed	Matched	Cross-listed	Matched
	(1)	(2)	(3)	(4)
$R_{i,t}$	-0.090**	-0.089***	-0.096***	-0.125***
	(2.05)	(6.21)	(11.05)	(3.13)
cl_ret_lag1y	-0.136**	0.000		
	(2.54)	(0.00)		
cl_ret_lag2y	-0.143***	-0.020		
	(2.77)	(0.55)		
cl_ret_lag3y	-0.121**	-0.092*		
	(2.37)	(1.78)		
cl_ret_lag4y	-0.224***	-0.030		
	(4.27)	(0.73)		
cl_ret_lag1q			-0.108**	-0.043
			(2.23)	(0.84)
cl_ret_lag2q			-0.108**	-0.060
			(2.05)	(1.21)
cl_ret_lag3q			-0.098*	-0.048
			(1.71)	(1.01)
cl_ret_lag4q			-0.199**	0.051
			(2.47)	(1.12)
cl_ret_lag5q			-0.257***	-0.001
			(3.28)	(0.01)
cl_ret_lag6q			-0.116**	-0.013
			(2.36)	(0.44)
cl_ret_lag7q			-0.142***	-0.044
			(2.70)	(0.47)
cl_ret_lag8q			-0.071	-0.019
			(1.10)	(0.40)
cl_ret_lag9q			-0.205***	0.036
			(4.05)	(0.85)
$R_{i,t-1}$	-0.070***	-0.073***	-0.070***	-0.073***
	(3.27)	(5.95)	(3.27)	(6.10)
$CL \times R_{i,t-1}$	-0.023	-0.007	-0.023	-0.008
	(1.11)	(0.33)	(1.10)	(0.37)
$CDS_{i,t-1}$	-0.070***	-0.106***	-0.071***	-0.106***
	(7.14)	(8.80)	(7.15)	(8.79)
cl_ret_lead1-2y	Yes	Yes		
cl_ret_lead1-8q			Yes	Yes
Firm & Time FE	Yes	Yes	Yes	Yes
Country × Time FE	Yes	Yes	Yes	Yes
Obs.	367,085	286,986	367,085	286,986
R^2	0.076	0.049	0.076	0.049

Table 15 (continued)

This table provides estimates of our main regression in Table 4, augmented to allow for anticipatory and post-treatment effects of the cross-listing on the stock-CDS return co-movement, as specified in Equation (4). Columns 1 and 2 allow for leads of up to two years, and post-treatment effects of up to four years. More specifically, the first two columns add interaction terms between the contemporaneous stock return and an indicator variable that defines one or two years prior to the foreign listing, and one-to-three years after the foreign listing, and the period marking the time beyond four years after the cross-listing. Columns 3 and 4 allow for leads and lags of up to eight quarters. For instance, CL_ret_lead1y = CL_lead1y×$R_{i,t}$, where CL_lead1y is a dummy that equals one if the date is within one year before cross-listing event. Similarly, CL_ret_lag2q = CL_lag2q×$R_{i,t}$, where CL_lag2q is a dummy that equals one if the date is within two quarters after the cross-listing event. The coefficient on CL is multiplied by 1,000. Firm, time (weekly), and country times time fixed effects are present in all specifications. Each regression also includes the CL dummy and a constant, which are not shown. The coefficients on leads are also not known due to their insignificance. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 16. Robustness: Multivariate logit estimation of the probability of cross-listing

	(1)	(2)	(3)	(4)	(5)	(6)
$Correlation_{i,t}$	0.163	-0.008	-0.193			
	(0.82)	(0.03)	(0.78)			
$Correlation_{i,t-1}$		0.069	-0.161			
		(0.27)	(0.71)			
$Correlation_{i,t-2}$		0.127	-0.101			
		(0.50)	(0.45)			
$Correlation_{i,t-3}$		-0.065	-0.022			
		(0.26)	(0.10)			
$Correlation_{i,t-4}$		0.076	-0.161			
		(0.31)	(0.72)			
$Kappa_{i,t}$				0.344	0.184	-0.062
				(1.19)	(0.50)	(0.16)
$Kappa_{i,t-1}$					0.253	0.004
					(0.69)	(0.01)
$Kappa_{i,t-2}$					0.156	0.159
					(0.43)	(0.42)
$Kappa_{i,t-3}$					-0.057	-0.081
					(0.16)	(0.21)
$Kappa_{i,t-4}$					0.153	0.089
					(0.44)	(0.25)
CDS $Spread_{i,t}$			-9.404***			-9.616***
			(4.60)			(4.68)
$Depth5y_{i,t}$			-0.059***			-0.053***
			(3.33)			(2.97)
$ROA_{i,t}$			1.319*			1.204
			(1.81)			(1.64)
$Leverage_{i,t}$			1.062***			1.069***
			(3.57)			(3.59)
$P/B_{i,t}$			0.030**			0.029**
			(2.53)			(2.47)
$MkCap_{i,t}$			0.211*			0.215*
			(1.81)			(1.85)
$Analysts_{i,t}$			0.056***			0.056***
			(8.09)			(8.09)
$Illiquidity_{i,t}$			0.304***			0.303***
			(9.22)			(9.19)
Previous $CL_{i,t}$			0.035			0.031
			(1.40)			(1.24)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Home × Host FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	10,335	8,952	8,767	10,335	8,952	8,767
Pseudo R^2	0.67	0.68	0.70	0.67	0.68	0.70

Table 16 (continued)

This table looks at the probability of a firm listing its equity on a foreign stock exchange. The sample includes quarterly observations for 241 cross-listed firms and 202 matched firms between 2001 and 2013. Each column displays the results of a multivariate logit regression as follows:

$$Pr\left(CL = 1 \mid X\right) = 1/\left(1 + e^{-X}\right),$$

where

$$X = \alpha + \gamma_t + \beta\, CDS\_Equity\_Comovement_{i,t} + Controls_{i,t} + Home \times Host\_FE.$$

The variable CL is a dummy variable that equals one after cross-listing events, and zero otherwise. The $CDS\_Equity\_Comovement_{i,t}$ is the Pearson correlation coefficient between daily CDS and equity market returns of firm *i* in quarter *t*. The $Kappa_{i,t}$ is the transformed Kendall Tau correlation in quarter *t*, as defined in Equation (4). Spread5y is the average CDS spread. Depth is the number of dealers providing quotes for the computation of the mid-market CDS spread. ROA, Leverage, and P/B are defined in Table 4. Analysts is the average number of analysts covering a firm, sourced from the I/B/E/S database. $Illiquidity_{i,t}$ is the Amihud illiquidity measure of firm *i* in quarter *t*. Previous $CL_{i,t}$ measures the number of foreign listings outside the home market for firm *i* at time *t*. The coefficient on MkCap is multiplied by 100,000. Each regression includes the time (quarterly) and home time host fixed effects, as well as a constant, which is not shown. The absolute t-statistics are in parentheses. The number of observations and Pseudo R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 17. Robustness: Interaction of firm-specific variables with the cross-listing dummy

	Matched	Cross-listed	DID
$R_{i,t}$	-0.079***	-0.043*	-0.076***
	(3.95)	(1.94)	(3.90)
$R_{i,t-1}$	-0.070***	-0.085***	-0.066***
	(4.32)	(2.98)	(4.25)
$CL \times R_{it}$	-0.009	-0.174***	-0.009
	(0.26)	(5.19)	(0.25)
$CL \times R_{i,t-1}$	-0.010	-0.036	-0.010
	(0.37)	(1.23)	(0.37)
$CDS_{i,t-1}$	-0.090***	-0.041***	-0.058***
	(5.45)	(3.46)	(-5.53)
CL	0.001	0.001*	0.001**
	(1.45)	(1.89)	(2.25)
$ROA_{i,t}$	0.003	-0.005*	-0.082
	(1.07)	(1.87)	(0.39)
$Leverage_{i,t}$	0.387*	0.217	0.247**
	(1.74)	(1.49)	(1.99)
$P/B_{i,t}$	0.048	-0.703	-0.011
	(0.36)	(0.00)	(0.16)
$MkCap_{i,t}$	-0.333	-0.544	-0.000
	(0.65)	(0.06)	(0.07)
$CL \times ROA_{i,t}$	-0.002	0.008***	0.003
	(-0.67)	(2.84)	(1.48)
$CL \times Leverage_{i,t}$	-0.046	-0.248*	-0.002*
	(0.30)	(1.93)	(1.85)
$CL \times P/B_{i,t}$	-0.023	0.011	0.015
	(0.26)	(0.01)	(0.22)
$CL \times MkCap_{i,t}$	-0.508	0.201	-0.000
	(1.04)	(0.47)	(0.30)
$D \times R_{i,t}$			0.029
			(0.98)
$D \times R_{i,t-1}$			-0.023
			(-0.69)
$D \times CL \times R_{it}$			-0.170***
			(-3.58)
$D \times CL \times R_{i,t-1}$			-0.030
			(-0.76)
D			-0.002
			(0.01)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Obs.	210,862	337,353	548,215
R^2	0.038	0.057	0.048

Table 17 (continued)

This table shows the main regression results after including interactions of the key firm-specific variables with the cross-listing dummy. The sample period is 2001-2013 and the data is daily. The dependent variable is the CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return of firm *i* at date *t*. CL is a dummy variable which equals one after cross-listing and zero otherwise. ROA is the return on assets, Leverage is the long-term debt divided by the sum of long-term debt and market value of equity, P/B is the price-to-book ratio, MkCap is the market capitalization. All other control variables in Table 6, such as $R_{w,t}$, $R_{c,t}$, ΔVIX, ΔDS, ΔTS, are also included in all specifications. Each regression includes firm fixed effects, as well as a constant, which is not shown. The standard errors are clustered by firm and time. The absolute t-statistics are in parentheses. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Table 18. Robustness: The global and local channels of cross-asset integration

	Matched	Cross-listed	DID	Matched	Cross-listed	DID
	(1)	(2)	(3)	(4)	(5)	(6)
$R_{i,t}$	-0.101***	-0.065**	-0.100***	-0.064***	-0.052*	-0.064***
	(4.79)	(2.15)	(4.79)	(4.39)	(1.74)	(4.35)
$R_{i,t-1}$	-0.085***	-0.083***	-0.084***	-0.056***	-0.079**	-0.056***
	(5.22)	(2.98)	(5.23)	(3.86)	(2.55)	(3.84)
$CL \times R_{it}$	0.021	-0.143***	0.0206	0.002	-0.141***	0.001
	(0.61)	(3.80)	(0.60)	(0.06)	(3.68)	(0.03)
$CL \times R_{i,t-1}$	0.008	-0.041	0.007	-0.009	-0.045	-0.009
	(0.27)	(1.39)	(0.27)	(0.30)	(1.33)	(0.31)
$CDS_{i,t-1}$	-0.092***	-0.016	-0.093***	-0.073*	-0.012	-0.074*
	(3.70)	(1.41)	(3.73)	(1.92)	(0.93)	(1.94)
CL	0.055*	0.083**	0.0703**	0.078	0.132**	0.115**
	(1.73)	(2.03)	(2.08)	(1.56)	(2.39)	(2.19)
$R_{w,t}$	-0.263***	-0.390***	-0.264***	-0.295***	-0.378***	-0.307***
	(3.93)	(6.26)	(3.90)	(3.68)	(5.39)	(3.85)
$CL \times R_{w,t}$	-0.304***	-0.221***	-0.298***	-0.308***	-0.213***	-0.296***
	(3.81)	(3.35)	(3.65)	(3.17)	(2.86)	(2.88)
$R_{c,t}$	-0.165***	-0.144***	-0.163***	-0.214***	-0.075*	-0.212***
	(3.80)	(4.02)	(3.78)	(2.65)	(1.78)	(2.64)
$CL \times R_{c,t}$	-0.217***	-0.136***	-0.214***	-0.220**	-0.182***	-0.215**
	(4.18)	(2.67)	(4.10)	(2.55)	(2.86)	(2.47)
$CL \times CDS_{i,t-1}$	0.039	-0.034**	0.039	0.025	-0.019	0.025
	(0.14)	(2.01)	(0.14)	(0.59)	(0.88)	(0.59)
$R_{w,t}$ (bond)				0.035	0.234***	0.047
				(0.34)	(2.67)	(0.46)
$R_{c,t}$ (bond)				0.651**	0.420*	0.649**
				(2.45)	(1.95)	(2.43)
$CL \times R_{w,t}$ (bond)				0.250**	0.185*	0.248**
				(2.04)	(1.69)	(2.03)
$CL \times R_{c,t}$ (bond)				-0.101	0.239	-0.092
				(0.25)	(0.82)	(0.22)
$D \times R_{i,t}$			0.035			0.011
			(0.95)			(0.34)
$D \times R_{i,t-1}$			0.001			-0.024
			(0.04)			(0.70)
$D \times CL \times R_{it}$			-0.163***			-0.142***
			(3.24)			(2.81)
$D \times CL \times R_{i,t-1}$			-0.048			-0.036
			(1.21)			(0.78)
$D \times CDS_{i,t-1}$			0.077***			0.062
			(2.86)			(1.57)
$D \times R_{w,t}$			-0.121			-0.062
			(1.53)			(0.73)
$D \times CL \times R_{w,t}$			0.074			0.079
			(0.76)			(0.69)
$D \times R_{c,t}$			0.019			0.135
			(0.37)			(1.58)
$D \times CL \times R_{c,t}$			0.078			0.032
			(1.15)			(0.33)

Table 18 (continued)

$D\times CL\times CDS_{i,t-1}$			-0.037 (1.14)			-0.044 (0.94)
D			-0.082 (0.01)			-0.014 (0.00)
$D\times R_{w,t}$ (bond)						0.179* (1.74)
$D\times R_{c,t}$ (bond)						-0.227 (0.77)
$D\times CL\times R_{w,t}$ (bond)						-0.060 (0.48)
$D\times CL\times R_{c,t}$ (bond)						0.330 (0.75)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm & Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	286,986	367,214	654,200	106,876	220,620	327,496
R^2	0.039	0.058	0.050	0.046	0.060	0.055

This table provides results on the economic channels leading to the increase in co-movement between CDS and stock returns. The sample period is 2001-2013. The matched sample is constructed using a Euclidean distance-based matching algorithm, as described in the caption of Table 5. For the matched firms, we set a pseudo cross-listing date identical to the corresponding cross-listed firm. The dependent variable is the daily CDS return, $CDS_{i,t}$. $R_{i,t}$ is the gross equity return for firm *i* at date *t*. CL is a dummy variable which equals one after foreign listing and zero otherwise. D is a dummy variable which equals one for cross-listed firms and zero for matched firms. $R_{w,t}$ is the MSCI world index return, $R_{c,t}$ is the residuals from a regression of the home market MSCI country index returns on $R_{w,t}$. $R_{w,t}$ (bond) is the Citigroup World Government Bond Index return in US dollars. $R_{c,t}$ (bond) is the residuals from a regression of the Citigroup World Government Bond Index return in each home market on $R_{w,t}$ (bond). All other control variables are as in the specification of Table 4, but their estimates are not reported. CDS returns are from Markit. Firm and equity market returns are from Datastream and CRSP, respectively. Firms' financial accounting information is from Compustat Global. DID is the Difference-in-Difference test. Each regression includes firm and home country fixed effects as well as a constant, which is not shown. The standard errors are clustered by firm and time. The absolute t-statistics are in parentheses. The number of observations and adjusted R^2 are also reported. ***, **, and * indicate significance at 1%, 5%, and 10% levels.

Figure 1. This figure shows the average quarterly Pearson correlation coefficient between daily CDS and stock returns around the cross-listing event. Each point on the plot represents the average correlation over three adjacent quarters (*t*-1, *t*, and *t*+1). The sample period is 2001-2013 and it includes 241 cross-listing events that are related to 278 stock-CDS pairs. CDS returns are from Markit and firm returns are from Datastream.

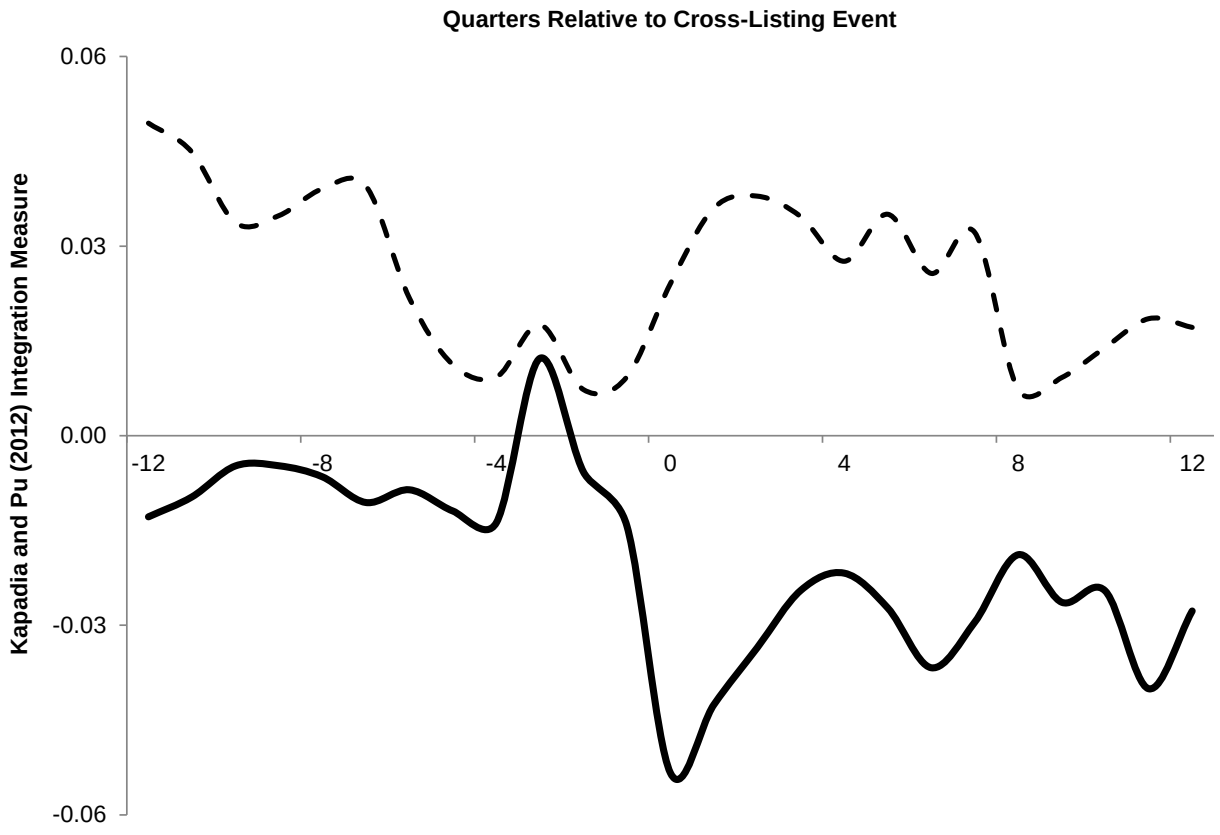

Figure 2. This figure shows the Kapadia and Pu (2012) integration measure between daily CDS and stock returns for the cross-listing and matched samples of firms around the cross-listing event. The solid curve is based on the cross-listing sample; the dashed curve – on the matched sample. Each point on the plot represents the average integration measure over three adjacent quarters (*t*-1, *t*, and *t*+1), after the time series has been de-trended. The sample period is 2001-2013 and it includes 241 cross-listing events that are related to 278 stock-CDS pairs. CDS returns are from Markit and firm returns are from Datastream.

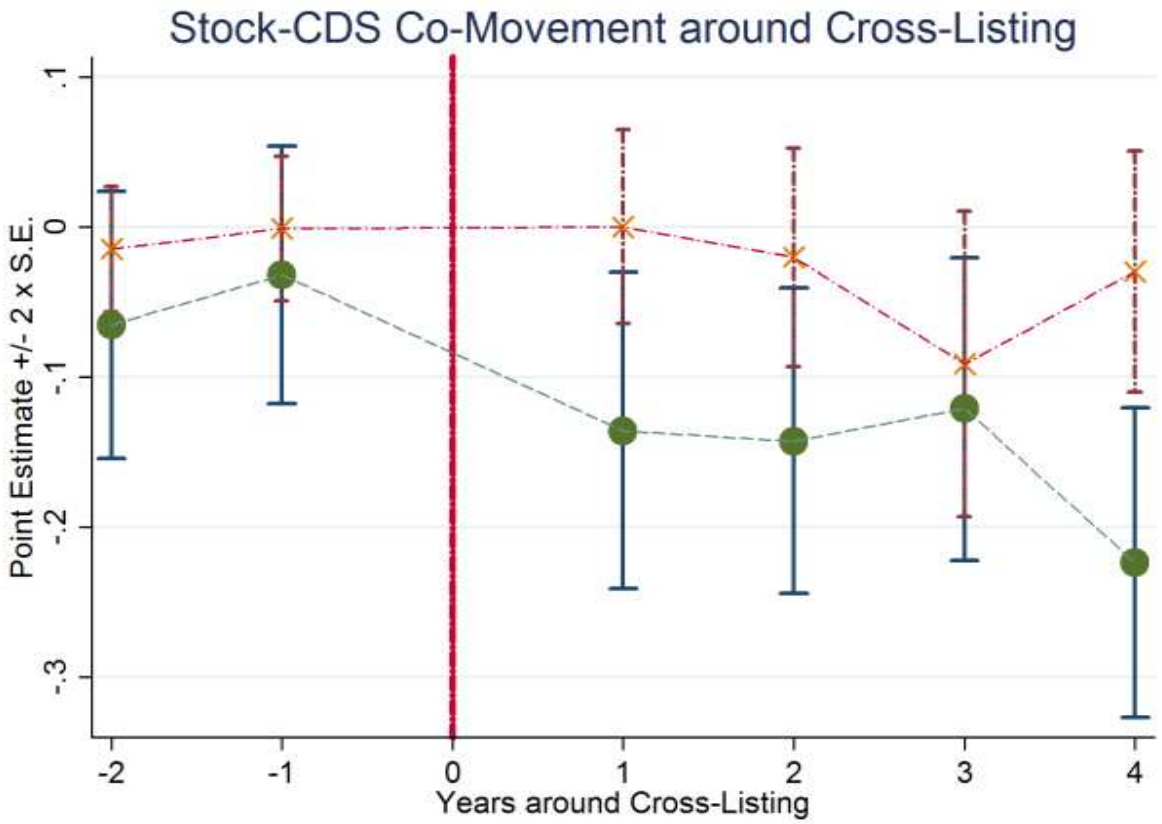

Figure 3. This figure shows the estimated coefficient on the interaction term between the stock return and an indicator variable that defines the number of years around the cross-listing event. The years before the cross-listing thus characterize anticipatory effects of the change in stock-CDS co-movement in reaction to the future cross-listing, while the years after the foreign listing characterize the change in stock-CDS co-movement that is a result of the cross-listing. The sample period is 2001-2013 and the treatment sample (dashed line) includes 241 cross-listing events that are related to 278 stock-CDS pairs. CDS returns are from Markit and firm returns are from Datastream.