# Cross-listing Decisions of firms and Output specialization

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## ABSTRACT

This study examines how output concentration in the domestic and destination countries impacts the cross-listing decisions of firms. Implementing a gravity model on a sample of 1779 firms from OECD countries over a period of 20 years, this study reconciles the basics of international/macroeconomics theories and the cross-listing decision. We find that output concentration of countries in particular industries is an important indicator in the cross-listing destinations decisions of firms. Using firm and industry level data, we empirically show that firms from countries that are specialized in a specific output industry undertake more cross-listing. More interestingly, we show that these firms prefer to cross-list in markets that are less competitive in the industry they are operating, contrary to the theoretical frameworks. We also find, especially for firm level analysis that firms seek diversification opportunities in deciding the cross-listing destination and do not obey the gravity model restrictions.

**Keywords**: Specialisation in output, cross-listing, gravity model, bilateral trade

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# 1. Introduction

A prominent consequence of globalisation and markets integration is output specialisation of countries. Thus, in order to remain competitive in a speedily globalised world market, countries have become more specialised in their output of specific industries (Aiginger & Davies, 2004; Bikker & Haaf, 2002). Consequently, firms in such markets face immense competition to access funds in their domestic markets due to the sheer number of firms competing for similar funds in the domestic market. Cross-listing primarily offers firms an option to diversify their sources of funds and maintain reasonable influence on the secondary market by choosing the trading location of their stocks. Studies on the specialisation of markets have also shown a considerable growth in the specialisation of stock exchanges in particular industries. For example, Bancel, Kalimipalli, and Mittoo (2004) shows that most firms from the financial sector cross-list on the London Stock Exchange (LSE) while high-tech firms tend to cross-list on NASDAQ. These developments pose a very vital question of how specialisation and more importantly to this study, the output specialisation of the domestic and destination markets impact the cross-listing decisions and destination choices of firms. Against this background, this study reconciles the basics of international economics theories and the cross-listing decisions of firms. Specifically, we examine whether the output concentrations/specializations of domestic or destination countries in particular industries, are relevant in the cross-listing destination choices of the firms that are operating within these industries.

The literature on the cross-listing destination choices of firms have shown that proximity (Ahearne, Griever, & Warnock, 2004; Chan, Covrig, & Ng, 2005; Dodd & Frijns, 2015) market development (Claessens, Klingebiel, & Schmukler, 2006; Hargis, 2000; Korczak & Korczak, 2013) as well as firm and/or industry specific characteristics (Abdallah & Ioannidis, 2010; Doidge, Karolyi, & Stulz, 2004; Lang, Lins, & Miller, 2003) are prominent determinants of cross-listing decisions and destination choice of firms. However, the literature is inconclusive on the determinants of the cross-listing decisions of firms and the destination choice especially in the face of several dynamics in the macroeconomic structures of markets and changing characteristics of firms. It is therefore important to understand how the specialisation in countries' output impacts the cross-listing destination choices of firms.

The economics literature emphasizes that the output/industrial concentration of countries is considered a significant indication of specialisation in production. Aiginger and Davies (2004) show that although regional concentration has considerably declined over recent years, country level production specialisation remain relevant and on the rise. Intuitively, increased specialisation in a particular industry of a country increases the likelihood of intensified competition among industry

players. Subsequently, specialisation of the domestic economy increases the competition among firms to access funds and investor pool, thus, driving firms to seek diversification of sources of funds through foreign listing. This notwithstanding, the literature ignores the impact of the increasing industrial specialisation of domestic economies on the cross-listing destination choices of firms. Similar to the agglomeration effect argument in the international economics literature, Pagano, Röell, and Zechner (2002) asserts that firm from a particular industry should cross-list on the same destination market to gain and/or maintain their competitive advantage.

Merging these two points, this study makes important contributions to the cross-listing literature. We show that firms from countries which are specialised in particular industries engage in more foreign listing in those industries. Most importantly, this study also shows that firms from such countries, cross-list in markets which are weaker and less competitive in the industry, in which these firms operate in. By using a gravity model, we control for bilateral linkages between domestic and destination markets and their economic performance on the cross-listing destination decisions of firms. Another important finding of this paper is on the diversification motives on cross-listing. We show that firms/industries seek different markets (no bilateral linkages) in cross-listing and do not conform to the gravity/proximity rule that were valid in explaining for the bilateral asset flows (Aviat & Coeurdacier, 2007; Frenkel, Funke, & Stadtmann, 2004; Lane & Milesi-Ferretti, 2008).

The rest of this study proceeds as follows. The study presents a review of the theoretical background and literature in section 2. Section 3 presents data and descriptive statistics while Section 4 presents the methodology. Section 5 presents the estimation results and analysis. Conclusions and implications follow in Section 6.

## 2. Literature Review

In the face of globalisation, international trade and asset flows have become more frictionless over recent years. Pioneering studies on international trade, asset flow and output specialisation including Porter (1990) show that the removal of international trade and asset flow barrier implied that countries were exposed to higher competition in their production output from other countries. A much recent study by Aiginger and Davies (2004), studying the industrial specialisation of European countries, shows that the integration of markets widened the consumption and competition horizons among world markets. As the competition between countries intensifies, Porter (1990) shows that no economy can and/or will be equally competitive in all or most of their industrial outputs but can only succeed in specific industrial output where they have competitive advantage. Subsequently, countries

have focused majority of their resources on industries were they have competitive advantage, leading to output specialisation in those particular industries (Ricci, 1999). In addition to being specialised in the output of particular industries, Barrios, Görg, and Strobl (2005) shows that factors such as institutional and economic frameworks contribute significantly to the success of output specialisation.

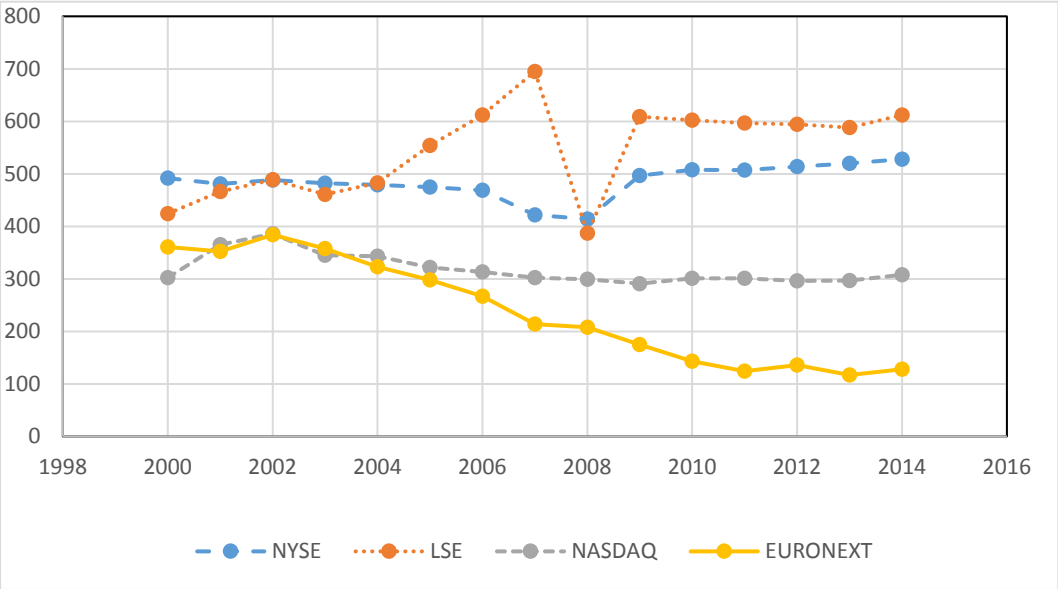
The finance literature however shows that as countries become more specialised in their output, firms in these countries face stiffer competition in raising funds from the domestic market (Bikker & Haaf, 2002). Also, investors tend to require higher returns for their investment due to the high competition for their funds (Dodd, 2013). Consequently, over the past recent years, cross-listing has become an increasingly vital strategy for firms. Coupled with the operations of firms becoming global, the ability to directly raise additional capital from foreign investors through foreign equity listing is of great importance to firms. Similarly, investors from foreign markets are also presented risk diversification options as firms cross-list. However, Recounting the motivation and reasons for cross-listing, previous studies show that firms seek foreign listing for reasons including increased analyst coverage (Baker, Nofsinger, & Weaver, 2002), improved information environment (Bris, Cantale, Hrnjić, & Nishiotis, 2012), improved liquidity (Bacidore & Sofianos, 2002; Berkman & Nguyen, 2010) better corporate governance (Karolyi, 2012; King & Segal, 2003; Li, Brockman, & Zurbruegg, 2015) and business strategy (Dodd, 2013; Pagano *et al.*, 2002). Previous studies have shown that these reasons are enabled in markets with specific characteristics, making it important to understand how these characteristics impact the cross-listing destination choices of firms (Pagano, Randl, Röell, & Zechner, 2001).

From an international economics perspective, since the new evidence on the destinations choices of firms by Krugman (1991), several studies have tried to understand firms' destination choices. For example, Cheng (2007) examines the location choices of firms in China using a nested logit model. He shows that the location choices of firms are initially motivated by regional potentials before choosing a country based on its characteristics. Devereux, Griffith, and Simpson (2007) study how existing agglomeration externalities and government grants policies for foreign firms impact the destination choices of firms. They show that firms are more interested in the agglomeration effects while government grants policies have very low impact on the location decisions of firms. Studies in this regard have been extended from the operation destination choices of firms to the foreign listing of firms. Although the cross-listing literature is inconclusive on the determinants of the destination market choices of firms for foreign listing, studies including Claessens *et al.* (2006); Dodd (2013); Gagnon and Karolyi (2010) among others, have shown that firms are attracted by the destination market characteristics while considering their own characteristics/needs. A reasonable number of studies (Abdallah & Ioannidis, 2010; Dodd, 2013; Pagano *et al.*, 2002) show that in addition to these

characteristics, the domestic market characteristics play a significant role in the cross-listing decisions and the destination choices of firms similar to Claessens *et al.* (2006); Korczak and Korczak (2013).

Studies on cross-listing patterns have shown considerable cross-listing dynamics on the major host markets over the past recent years. For example, Doidge, Karolyi, and Stulz (2009) examine the dynamics in the cross-listing patterns on the NYSE and the LSE . They show that the dynamics in the cross-listing patterns are associated to the dynamics in host market characteristics including stock market characteristics and economic performance. As shown in *Figure 1* markets including US, UK, French and Deutche markets were very prominent in years preceding the late 1990s due to their unique market characteristics (Dodd, 2013). Accounting for the changes in cross-listing patterns in *Figure 1,* the early 2000s saw high competition among all stock markets around the world to attract foreign firms causing considerable variations in the number of foreign listing on these traditionally dominant markets (Doidge *et al.*, 2009). Studies in an attempt to explain these patterns have used country characteristics such as disclosure standards, legal environment, proximity variables as well as economic performance of markets. For example, Sarkissian and Schill (2016) study the cross-listing waves and shows the relevance of the gravity model for the cross-listing patterns of firms. They further show that firms consider the pricing efficiencies of the host market. Abdallah and Ioannidis (2010) use a modified international asset pricing model and show that firms cross-list only when they have strong domestic performance. They also postulate that by cross-listing, firms take advantage of their prospective growth opportunities. However, these studies and the cross-listing literature, ignore the industrial output concentration of both the domestic and destination countries. We draw from the international economics literature on industrial output concentration to explain the cross-listing decisions of firms while attempting to explain the potential reasons for the dynamics in the cross-listing patterns.

We conjecture, similar to the international economics and cross-listing literature, that because firms' cross-listing decisions and destination choices are motivated by the characteristics of the domestic and destination markets, it is imperative to understand how dynamics in these characteristics affect the cross-listing destination choices of firms. More specific to this study, we show how the national production output of the domestic and destination market impact the destination choice decisions of firms for foreign listing especially in an era where countries are more specialised in their output.




**Note**: Figure 1 shows the cross-listing patterns on four of the world's largest stock exchanges: the NYSE (including MKT and ARC), NASDAQ, LSE (including AIM) and EURONEXT from the period 2000-2014 sourced from the world federation of exchanges (www.world-exchanges.org)

## 3. Data and Descriptive Statistics

This study examines the national industrial output concentration of the Organization for Economic Co-operation and Development (OECD) countries for the period 1995-2014 and the cross-listing destination decisions of firms from these countries. We use data from OECD countries motivated by the considerably balanced industrial concentration of member countries. The OECD sample provides a range of specialised and diversified countries giving us a comprehensive analysis of several industries. Also, OECD countries show evidence of higher inclination towards maintaining a particular output orientation/concentration and exhibit high reluctance to de-specialise in the long run which makes it suitable for the sample period (Dalum, Laursen, & Villumsen, 1998).

For the list of cross-listed firms, we employ *Datastream* database. The data output indicates the home and host countries and types of listing instruments including Close-Ended funds, Exchange traded funds, American Depository Receipts (ADR), General Depository Receipts (GDR), common and preferences shares. The initial sample consist of 4961 firms from 34 OECD countries after we ignore dead/delisted firms and Over the Counter (OTC) listed firms in line studies by Doidge *et al.* (2009) and Sarkissian and Schill (2012). We also ignore listings in Germany and Latvia; for data inconsistency and selection criteria failure reasons respectively[2].

[2] The initial sample does not include Germany due to the data size and discrepancies. Foreign listed firms in Latvia showed to be only OTCs.

The period of examination and number of firms are guided purely by data availability and consistency. We further compare the cross-listing data given by *Datastream* database for the US to that provided by the Bank of New York Mellon Corporation and JP Morgan Chase and Co. The Bank of New York Mellon Corporation and JP Morgan Chase and Co provides a list of all cross-listings (mostly ADRs) around selected markets with more emphasis on the US. For the US, the study considers firms listed on only the New York Stock Exchange (NYSE) and the NASDAQ. The NYSE and NASDAQ are two of the largest stock exchanges in the US and the world. These stock markets have comparatively high listing requirements, better shareholder protection frameworks and disclosure requirements. They are also two of the most desired destination markets for most cross-listing firms (Abdallah & Ioannidis, 2010; Doidge *et al.*, 2009). The implementation of the selection criteria leaves the sample firms standing at 1779 from 34 OECD countries.

For firm and industry level analysis, we aggregate firm level characteristics including performance variables: return on assets ($ROA_{i,k,t}$), return on capital employed ($ROCE_{i,k,t}$), gross profit margin ($GPM_{i,k,t}$) and log of sales scaled by log of real Gross domestic products of country $i$ $(Sales/GDP)_{ik,t}$ and size variables: total assets scaled by real Gross domestic products of country $i$ $(Total\ Assets/GDP)_{i,k,t}$ sourced from *Datastream* database (see Table 2 for data, definition and sources). Also, to help us undertake the firm level analysis, industry aggregate of cross-listings are created by summing the firm level cross-listings in the same industry.

As shown by Claessens *et al.* (2006); Hargis (2000); Korczak and Korczak (2013), market development of both the home and host markets serve as major determinants for the cross-listing destination choices of firms. For example Claessens *et al.* (2006) shows that firms from highly developed markets engage in more cross-listing as opposed firms from less developed markets. Korczak and Korczak (2013) on the other hand shows that firms from less developed markets engage in more cross-listing and engage in less cross-listing as their domestic market develops. This study therefore employs country market development variables ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of domestic (country $i$) and destination (country $j$) markets to capture their impacts on the cross-listing destination choices of firms. We also employ data on industry output concentration of home and host countries which we measure as the value added to the total national GDP of their respective domestic markets by each industry. This data has been extracted from the OECD National Accounts Statistics database. Given that output concentration data are presented in accordance with the International Standard Industrial Classification (ISIC) Revision 4, we match our sample firms with their respective

ISIC coding[3]. We use data on bilateral trade relationship between the home and host country extracted from the Structural Analysis (STAN) database measured by the bilateral exports between the domestic and destination markets. This is to capture the impact of existing bilateral trade between the host and home country and their impact on the cross-listing decisions of firms from both countries. Common to the gravity models in international trade, we employ a considerable number of dummy variables which capture common bilateral cultural factors including contiguous ($Contigious_{i,j}$), common language ($Com\_Language_{i,j,t}$) common region ($Com\_Region_{i,j,t}$), distance ($Distance_{i,j,t}$) and common legal framework ($Legal\_system_{i,j,t}$) from the French Research Centre in International Economics (CEPII).

Table 3a (see Appendices) presents summary statistics for main variables, domestic (country $i$) and destination (country $j$) country, firms characteristics and bilateral factors in a given year for the period 1995 to 2014. We observe relatively similar median values for market development ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of both the home and host markets while the mean for output concentration ($Con_{i,k,t}$) for both markets are very similar. This is quite intuitive based on the background that a majority of the sample countries are developed markets and with well-established markets and economic performance indicators. This is further supported by the similar means of real GDPs ($GDP_{i,t}$ and $GDP_{j,t}$) of host and home countries. We also observe high standard deviations for all financial performance measurement variables ($ROA_{i,k,t}$, $ROCE_{i,k,t}$ and $GPM_{i,k,t}$). We again observe that Gross Profit margin ($GPM_{i,k,t}$), Return on Assets ($ROA_{i,k,t}$) and Return on Capital Employed ($ROCE_{i,k,t}$) are the most negatively skewed. However, generally, most of the variables are positively skewed with Log of sales scaled by log of GDP of country $i$ $(Sales/GDP)_{ik,t}$ and total asset scaled by total productivity of country $i$ $(Total\ Assets/GDP)_{i,k,t}$ being the most positively skewed. Values for kurtosis show majority of the variables have heavier tails than a normal distribution except common legal framework ($Legal\_system_{i,j,t}$), distance ( $Distance_{i,j,t}$ ), common region ($Com\_Region_{i,j,t}$), common language ($Com\_Language_{i,j,t}$) and contiguous ($Contigious_{i,j}$) which has a light tail.

Similarly, Table 3b presents summary statistics for industry characteristics as well as domestic and destination market characteristics. For the industry characteristics, we create an industry matrix by averaging the firm performance ratios ($ROA_{i,k,t}$, $ROCE_{i,k,t}$ and $GPM_{i,k,t}$) while aggregating the cross-listings on firm level to industry basis allowing for industry analysis. We also observe that the standard deviations of most of the variables indicate close dispersion around their means for both industry and home and host countries characteristics. Most of the variables are positively skewed except $ROA_{i,k,t}$,

[3] The ISIC code provides coding for a broader classification of industry activities. Rev 4 is the latest available version of the ISIC codes making earlier classifications and coding obsolete

$ROCE_{i,k,t}$ , $GPM_{i,k,t}$ , $GDP_{i,t}$ and the proximity variables ($Legal\_system_{i,j}$, $Distance_{i,j}$ and $Com\_Region_{i,j}$). Combining the skewness and kurtosis values of the data for the variables employed in this study, we can generalise that the data is not normally distributed indicating general positive skewness and peaked data. We test the stationarity of our variables by implementing a panel unit root test and reject the null hypothesis that the variables have panel unit roots. We also find no presence of multicollinearity after analysing the correlation table of the variables[4].

## 4. Methodology

The study begins by examining the impact of domestic and host countries' output concentration on cross-listings decisions of firms. Specifically, we examine how the industrial output concentration of domestic and destination markets impact the cross-listing decision of firms. Cross-listing is widely regarded as a form of international asset flow. Consequently, examining cross-listing flows between domestic and host countries will be comparable to modelling a gravity model for bilateral financial asset flow (Domowitz, Glen, & Madhavan, 1998; Foerster & Karolyi, 1999). Also, the economic indicators and market development of a country show a strong positive correlation with bilateral asset flow (Sarkissian & Schill, 2016). Subsequently, measuring the share of cross-listing between the domestic and destination markets, we model a gravity model for bilateral financial asset flow or bilateral trade from the international trade literature (Lane & Milesi-Ferretti, 2008). The model infers that the cross-listing volume between the host and home country is a positive function of both countries' performance and proximity. Specifically, the gravity model shows that international trade/ asset flows are more likely between countries which are proximate in geography, cultural and economic performance. The performances of the domestic and destination countries are measured by their real Gross Domestic products in this study. Proximity is measured by the similarities between the host and home countries based on the bilateral geographic distance, common language, common legal framework and contiguous from CEPII[5] in line with the gravity model (Chițu, Eichengreen, & Mehl, 2013).

The initial econometric model we derived from the general gravity framework is specified below:

$$Share_{i,j,k,t} = \alpha_{i,k} + \beta X_{i,j,k,t} + \emptyset_1 Con_{i,k,t} + \emptyset_2 Con_{j,k,t} + z_{i,k,t} + \varepsilon_{i,j,k,t} \quad (1)$$

[4] The correlation table and unit root results will be available upon request.

[5] CEPII is a French research outfit which produces world economy databases, research and analysis

Where the dependent variable $Share_{i,j,k,t}$ is the share of cross-listing from firm (industry) $k$ in the home country (country $i$ ) to a particular industry in the host country (country $j$) at time $t$. $Con_{i,k,t}$ represents the value added by industry $k$ in country $i$ to the total national output of country $i$ at time $t$. Similarly, $Con_{j,k,t}$ is the value added by industry $k$ in country $j$ to the total national output of country $j$ at time $t$. By using $Con_{i,k,t}$ and $Con_{j,k,t}$ the study captures how the output concentration in both the domestic (country $i$) and destination (country $j$) countries impact the cross-listing decision and the destination choices of firms. $Z_{i,k,t}$ is a matrix that represents firm(industry) specific characteristics including performance and profitability variables, Return on Assets ($ROA_{i,k,t}$) Return on capital employed ($ROCE_{i,k,t}$) , Gross profit margin ($GPM_{i,k,t}$), log of Sales scaled by log of real GDP ($(Sales/GDP)_{ik,t}$) and total assets scaled by real GDP $(Total\ Assets/GDP)_{i,k,t}$

This study includes gravity equation variables along with bilateral linkage variables captured in ($X_{i,j,k,t}$) including $Export_{i,j,t}/GDP_{i,t}$ as well as market development variables ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT_{CAP_{j,t}}/GDP_{j,t}$) in accordance with the gravity model. Dodd *et al.* (2015) shows that the cross-listing destination decision is immensely influenced by bilateral cultural/common factors. Similarly, Bianconi and Tan (2010) show that firms from common law countries tend to have better corporate governance culture thus, fostering cross-listing onto markets with similar legal framework. By implementing the gravity model and following the literature, we control for the impact of such proximity variables including, common language ($Com\_Language_{i,j}$), geographical proximity ($Contigious_{i,j}$ and $Distance_{i,j}$) and similarities in legal framework ($Legal\_system_{i,j}$) consistent with the gravity model. These variables are dummy variables that take the value of 1 if country $i$ and country $j$ share similar cultural factors and 0 if otherwise with the exception of distance variable ($Distance_{i,j}$).

## 5. Estimation Results and Analysis

This section presents estimation results of how the production output concentration of domestic and destination markets impact the cross-listing destination choices of firms. We present firm level analysis and industry level analysis while showing how firm and industry characteristics impact the cross-listing choices of firms.

### 5.1 Firm Level Analysis

Table 4 presents firm level analysis for the determinants of cross-border listing of firms from country $i$ to $j$ . We report pooled ordinary least squares (OLS) estimation results in column 1. T-statistics are presented in parenthesis while Heteroskedasticity and Autocorrelation corrected standard errors are used for the estimation.

Focusing on the main contribution of this paper, output concentration ($Con_{i,k,t}$) has a significant and positive impact on the cross-listing destination decisions of firms, implying that firms from home country (*i*) with high output concentration in a particular industry cross-list more abroad. This might indeed be considered as a solid sign of firms seeking diversification as well as a means of firms seeking ways to compete less in the domestic financial markets. These results are also important indications that as domestic industries become more competitive, firms tend to spillover to other markets, similar to Claessens, Demirgüç-Kunt, and Huizinga (2001) proposed before. Also, these are in line with Greenaway, Sousa, and Wakelin (2004) who show that importation of multinational companies into the domestic market fosters stiffer competition. They further show that this competition results in domestic firms seeking new markets and creating an indirect spillover onto these new market.

Looking from the host market side, output concentration of host country (*j*) ($Con_{j,k,t}$) has a significant and negative relationship with the cross-listing decision of firms. This suggests that firms from home markets (country $i$) operating in a particular industry, will engage in less cross-listing in the host country (country $j$) that has higher output concentration/specialisation in that industry. These results are also in line with firms' competition motivations. Impliedly, these firms are looking for markets that have less competition in the industries they operate in. These outcomes indeed contradict Pagano *et al.* (2002), where they theoretically asserted that firms look for competitive markets to cross-list, due to the advertising effect. However, from other findings of the paper, the diversification motive outweighs the competition motive for the firms in this perspective.

Country characteristic: the level of market development of home country ($i$) measured by $MKT\_CAP_{i,t}/GDP_{i,t}$ has a positive and significant impact on the cross-listing destination choices of firms only when we control for both industry and year fixed effects while market development of host market ($MKT\_CAP_{j,t}/GDP_{j,t}$) has a negative significant impact. This suggests that firms from rich and developed markets cross-list more on smaller economies suggesting that firms look for less competitive markets to cross-list on (Claessens *et al.*, 2006). These outcomes further support our initial results. Real GDP of the home country ($GDP_{i,t}$) is positive and significant throughout all 4 models while real GDP of the host country $GDP_{j,t}$ is negative and significant. This further support the argument of Korczak and Korczak (2013)

Firm profitability and performance variables including, $ROA_{ik,t}$, $ROCE_{ik,t}$, $GPM_{k,t}$ and $(Sales/GDP)_{ik,t}$, are positive and significant suggesting that profitable firms engage in more cross-listing consistent with the findings of Lang, Raedy, and Yetman (2003); Pagano *et al.* (2002). Also, $(Total\ Assets/GDP)_{i,k,t}$ is positive and significant indicating that larger firms engage in more cross-

listing (Dodd, Frijns, & Gilbert, 2015). This is intuitive given that small, medium sized firms and non-profitable firms find it difficult to manage the initial cost in cross-listing as shown in the literature[6].

Bilateral factors: Distance ($Distance_{i,j}$), common language ($Com\_Language_{i,j}$) and common region ($Com\_Region_{i,j}$) are positive and significant suggesting that firms look for further markets for diversification as opposed to the gravity rule. $Contigious_{i,j}$ is negative and significant providing more evidence that firms seek diversification opportunities and further shows a weakening of the proximity bias and an indication of firms seeking diversification outside proximate markets. Common legal system ($Legal\_system_{i,j}$) is negative and insignificant. $\mathrm{E}xport_{i,j,t}/GDP_{i,t}$[7] of home country has a significant negative impact on cross-listing decisions of firms, suggesting that trade connections between countries negatively impact cross-listing which is the gravity rule in the international finance literature. Similarly, this is supported by the exports coefficients ($\mathrm{E}xport_{i,j,t}/GDP_{i,t}$). The opposite and significant signs of the gravity equation variables (opposed to the previous literature by Aviat and Coeurdacier (2007); Frenkel *et al.* (2004); Lane and Milesi-Ferretti (2008) ) also support our argument that firms look for less competitive and different markets to cross-list in. Our results are robust after we control for time and industry fixed effects, reported in columns 3 and 4.

In column 2, we control for industry fixed effects and notice an increase in coefficients of $GPM_{k,t}$, $ROCE_{ik,t}$ and $ROA_{ik,t}$ but they becomes negative and insignificant. All other variables remain very similar to initial coefficients in column 1. Similarly, Column 3 reports estimation results with time fixed effect controlled for while column 4 report estimation results with both industry-fixed effects and time-fixed effects controlled for. It is worth noting that the coefficients remain mostly similar to the initial model with meagre variations.

## 5.2 Industry Level Analysis

Table 5 presents industry level analysis for the determinants of cross-border listing of firms from country $i$ to $j$. Empirically, we have piled up the cross listing numbers and create industry aggregates and implemented the models again. Pooled ordinary least squares (OLS) estimations are reported in the first column (*1*). Similar to Table 4, T-statistics are presented in parenthesis while Heteroskedasticity and Autocorrelation corrected standard errors are used for the estimation.

From the industry aggregate analysis, output specialisation in an industry ($Con_{i,k,t}$) has a significant positive impact on the cross-listing destination decisions of the firms. Similar to firm-level estimation

[6] See for example, Frijns, Dodd, and Cimerova (2016)

[7] We have employed Total trade/GDP variable as well and the results are also similar.

results, this suggests that industries with high contribution to total production output of country $i$ cross-list more. Also industry share of host ($j$) reflect the initial findings in Table 4 emphasizing that firms from home markets ($i$ ) with low output concentration in industry ($k$) cross-list less to host country ($j$) if the output specialisation in industry ( $k$) is more in country ( $j$).

From the country characteristics variables, market development variables for both home ($i$) and host ($j$) countries are negative and significant, indicating that industries in small countries cross-list more in larger economies. This is in line with the stream of literature which shows more cross-listings flow from emerging and small economies to developed and large economies (Korczak & Korczak, 2013). Real GDP of the home country ($GDP_{i,t}$) positive and significant while the real GDP of the host country ($GDP_{i,t}$) is negative and significant similar to the firm level analysis results in Table 4.

For industry characteristics, industry profitability and performance variables including, return on assets ($ROA_{i,k,t}$), return on capital employed ($ROCE_{ik,t}$), gross profit margin ($GPM_{i,k,t}$) and $(Sales/GDP)_{ik,t}$ are all negative with only $ROA_{i,k,t}$ being significant.

Bilateral factors :proximity variables including, common legal system ($Legal\_system_{i,j}$) has a negative significant impact on the destination decisions of firms. $\mathrm{E}xport_{i,j,t}/GDP_{i,t}$ are negative and significant, distance is positive but insignificant, common region ($Com\_Region_{i,j}$) is positive and significant, common language ($Com\_Language_{i,j}$) and $Contigious_{i,j}$ are negative and significant. Combining all the bilateral variables, it is clear that firms seek diversification opportunities and a weakening of the gravity rules in the international economics and finance literature.

We control for industry fixed effect and time fixed effect in column 2 and 3 respectively and observe no significant changes to the impact of the independent variables on the dependent variables except $ROA_{i,k,t}$ which becomes positive and significant. Column 4 report estimation results with control for both time and industry fixed effects with no significant changes to the initial results.

### 5.3 Robustness Checks: Dynamic GMM model analysis

The cross-listing literature show that the bilateral cross-listing between the domestic and destination country could be impacted by previous cross-listing proportions (Benos & Weisbach, 2004). They argue that the magnitude of cross-listing in a given location is associated with the success and/or the presence of firms from the same industry. This is likely to create a familiarity bias of firms especially, firms from the same country and/or industry (Leblang, 2010). Consistent with this literature, we postulate that our results shown in Table 4 and 5 could be as a result of previous cross-listing effect as well the lag effects of independent variables. To overcome this problem, we establish a Generalised Method of Moment model (GMM) which takes into account the lag of the dependent variable. We

employ a panel GMM model with first difference transformation and white period instrument weighing matrix. By implementing this method, we provide a heteroscedasticity and autocorrelation consistent estimates of the standard errors and covariance matrix given in Equation (1). Furthermore, we are also able to test the robustness of our results by adopting the GMM model.

The GMM model is expressed as:

$$\Delta Share_{i,j,k,t} = \alpha_{i,k} + \Delta Share_{i,j,k,t-1} + \beta \Delta X_{i,j,k,t} + \emptyset_1 \Delta Con_{i,k,t} + \emptyset_2 \Delta Con_{j,k,t} + \Delta z_{i,k,t} + \varepsilon_{i,j,k,t} \quad (5)$$

Table 6 presents firm level GMM estimation results for the determinants of bilateral cross-listing between the domestic and destination countries. We implement a first difference transformation panel GMM model with period instrument weighting matrix. We test for first and second-order correlation using Arellano-Bond (AB1 and AB2) tests and the P-values are greater than 10% implying we do not have enough evidence of the presence of autocorrelation. This further validates the use of suitably lagged endogenous variables as instruments. Moreover, we test for over-identification restrictions and the P-value are higher than 10%, thus, we fail to reject the null hypothesis that the instruments used are exogenous in our model. The results of the GMM estimation show that the lag of the dependent variable is positive and significant for the model, suggesting that the bilateral cross-listing between the home and host countries for a given period or year is impacted by the magnitude of cross-listing in the lag periods. This could be due to the success and/or benefits experienced by firms already cross-listed on such markets which is in-line with the familiarity bias argument (see for example, Dodd *et al.* (2015). Output specialisation of the home market ($Con_{i,k,t}$) has a positive and significant impact on the dependent variable consistent with initial results in model (1). However, output concentration of the host market ($Con_{j,k,t}$) although remains negative is insignificant.

We also find that home market development ($MKT\_CAP_{i,t}/GDP_{i,t}$ ) has a negative and significant impact on the proportion of cross-listing similar to Korczak and Korczak (2013) who shows that less developed home markets engage in more cross-listing as compared to developed ones. Host market development ($MKT\_CAP_{j,t}/GDP_{j,t}$ ) is negative and insignificant. Home market GDP is negative but insignificant while GDP of host market is negative and insignificant.

For the firm specific characteristics, return on assets ($ROA_{i,k,t}$) is positive and significant while return on capital employed ($ROCE_{i,k,t}$) is negative and significant. Gross profit margin ($GPM_{i,k,t}$) is negative and insignificant. Log of Sales normalised by log of real GDP of home market $(Sales/GDP)_{ik,t}$ is negative and significant while total assets scaled by real GDP of home country, $(Total\ Assets/GDP)_{i,k,t}$,

is positive and significant. Bilateral factor; $\mathrm{E}xport_{i,j,t}/GDP_{i,t}$ although negative is not significant. In a nutshell, most of the variables consistent with our initial with few variations as shown in Table 6.

Table 7 presents industry-level GMM estimation results. Similar to firm-level analysis in Table 6, we implement a first difference transformation panel GMM model with period instrument weighting matrix. We test for first and second-order correlation using Arellano-Bond (AB1 and AB2) tests and the P-values are greater than 10% implying we do not have enough evidence of the presence of autocorrelation and further validating the use of suitably lagged endogenous variables as instruments. Again, we test for over-identification restrictions and the P-value are higher than 10%, thus, we fail to reject the null hypothesis that the instruments are exogenous in our model. We find that the lag of the dependent ($Share_{i,j,k,t-1}$ ) remains positive and significant. Also output concentration of the home country ($Con_{i,k,t}$) is a positive and significant determinant of cross-listing, emphasizing our initial findings in Tables 4, 5 and 6. Although output concentration of the home country ($Con_{j,k,t}$) is negative, it is not significant.

Similar to the findings in Table 6 and consistent with Korczak and Korczak (2013), market development of the home country ($MKT\_CAP_{i,t}/GDP_{i,t}$ ) shows that less developed markets engage in more foreign listing. This could be due to the greater financing opportunities on some foreign markets. For firm characteristics, we observe inconsistent results similar to earlier results shown in Table 5. Exports normalised by real GDP ($\mathrm{E}xport_{i,j,t}/GDP_{i,t}$) of home market is negative and significant reiterating the argument that firms do not obey the gravity rule when they cross list abroad. Although there are some inconsistencies in a number of variables, most of the results support the initial results.

## 6. Conclusions

This paper is the first to examine how the output concentration of domestic and destination countries impact the cross-listing and destination choice decisions of firms. We contribute to the cross-listing literature in two novel ways. Firstly, the general results of this study shows that firms from countries with high output concentration (specialised) in the industries they operate in cross-list more. More interestingly, these firms cross-list to countries which are weak in the industries which they operate in. Secondly, this study gives a strong indication that the cross-listing decisions of firms are motivated by diversification and also serves as an avenue for firms seeking ways to compete less. Our results further give an indication of the weakening of the proximity bias/preference for firms giving more

relevance to the diversification motive. Reconciling the international economic literature with our findings, we show that the results in this study is an important indication that as the home market of firms become more competitive, firms tend to spillover to other foreign countries through cross-listing. Also these outcomes contradict Pagano *et al.* (2002) where they theoretically asserted that firms look for competitive markets to cross-list, due to advertising effect. However, other findings of this study show that the diversification motive of firms outweighs the competition motive.

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# Appendices

## Table 1 Sectorial Decomposition

| Main Sectors Based On ISIC | Sub-Sector Code | Number Of Firms |
|---|---|---|
| Agriculture, Forestry And Fishing | | |
| | A01 | 30 |
| | A02 | 8 |
| Mining And Quarrying | | |
| | B05 | 162 |
| | B06 | 128 |
| | B07 | 49 |
| | B08 | 3 |
| | B09 | 32 |
| Manufacturing | | |
| | C11 | 27 |
| | C12 | 10 |
| | C14 | 38 |
| | C16 | 33 |
| | C20 | 40 |
| | C21 | 143 |
| | C22 | 26 |
| | C26 | 82 |
| | C27 | 56 |
| | C29 | 98 |
| | C30 | 24 |
| Electricity, Gas, Steam And Air Conditioning Supply | | |
| | D35 | 42 |
| Whole Sale Retail Trade | | |
| | G47 | 51 |
| Transport And Storage | | |
| | H51 | 37 |
| Accommodation And Food Services Activities | | |
| | I56 | 14 |
| Information And Communication | | |
| | J59 | 46 |
| | J61 | 68 |
| | J62 | 86 |
| Financial And Insurance Activities | | |
| | K64 | 158 |
| | K65 | 44 |
| | K66 | 78 |
| Professional, Scientific And Technical Activities | | |
| | M70 | 29 |
| | M74 | 29 |
| Administrative And Support Service Activities | | |
| | N79 | 56 |
| Human Health And Social Work Activities | | |
| | Q86 | 51 |
| Other Service Activities | | |
| | S96 | 1 |
| Total | | 1779 |

**Note:** Table 1 presents the sectors and sub-sectors per ISIC Rev 4 as well as the number of firms for each sub-sector employed in this study. International Standard Industrial Classification (ISIC) is an international reference classification of productive activities

**Table 2 Variable definitions and sources**

| Variable | Definition | Source |
|---|---|---|
| $Share_{i,j,k,t}$ | Share/ratio of cross-listing from country $i$ from industry $k$ listed in country $j$ | Manually calculated by author |
| $Con_{i,k,t}$ | Concentration of output of industry/firm $k$ in country $i$ | OECD statistics database |
| $Con_{j,k,t}$ | Concentration of output of industry/firm $k$ in country $j$ | OECD statistics database |
| $MKT\_CAP_{i,t}/GDP_{i,t}$ | Total market capitalisation of all listed firms in country $i$ scaled by real GDP of country $i$ | Datastream |
| $MKT\_CAP_{j,t}/GDP_{j,t}$ | Total market capitalisation of all listed firms in country $j$ scaled by real GDP of country $j$ | Datastream |
| $ROA_{ik,t}$ | Return on Assets of firm (industry) k | Datastream |
| $ROCE_{ik,t}$ | Return on capital employed of firm (industry) k | Datastream |
| $GPM_{ik,t}$ | Gross profit margin of firm (industry) k | Datastream |
| $Legal\_system_{i,j,t}$ | Dummy variable that takes the value of 1 if country $i$ and country $j$ have similar law or legal framework (civil law and/or common law) | Central Intelligence Agency's World FactBook |
| $Export_{i,j,t}/GDP_{i,t}$ | The ratio of country $i$'s real GDP from exports between country $i$ and country $j$ | OECD STAN database |
| $Distance_{i,j,t}$ | Log of distance between country $i$ and country $j$ based on bilateral distance between their largest cities | CEPII |
| $Com\_Region_{i,j,t}$ | Dummy variable that take the value of 1 if country $i$ and Country $j$ belong to the sample geographic region | CEPII |
| $Com\_Language_{i,j,t}$ | Dummy variable that takes the value of 1 if country $i$ and country $j$ have common language as their first official language spoken by at least 9% to 20% of the population and takes the value of 0 if otherwise | CEPII |
| $Contigious_{i,j}$ | Dummy variable that takes the value of 1 if country $i$ and country $j$ share boarders and 0 if otherwise | CEPII |
| $(Sales/GDP)_{i,k,t}$ | Log of Net sales of firm (industry) k scaled by log of real GDP of country $i$ | Datastream |
| $(Total\ Assets/GDP)_{j,k,t}$ | Total Asset of firm (industry) k scaled by real GDP of country $j$ | Datastream |
| $GDP_{i,t}$ | The log of real Gross Domestic Product of country $i$ | OECD statistics database |
| $GDP_{j,t}$ | The log of real Gross Domestic Product of country $j$ | OECD statistics database |

Note: This table presents variable definitions and the source of data for this study. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) is a research centre which provides international economics database on world economies and their evolution.

## Table 3a Descriptive Statistics for Firm level Analysis

| Variables | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| $Share_{i,j,k,t}$ | 0.076 | 0.032 | 0.037 | 0.001 | 0.005 | 30.565 | 1495.432 |
| $Con_{i,k,t}$ | 0.024 | 0.015 | 0.396 | 0.003 | 0.003 | 5.379 | 47.220 |
| $Con_{j,k,t}$ | 0.023 | 0.014 | 0.396 | 0.001 | 0.028 | 3.500 | 29.397 |
| Country Characteristics | | | | | | | |
| $MKT\_CAP_{i,t}/GDP_{i,t}$ | 0.095 | 0.095 | 0.397 | 0.001 | 0.048 | 69.304 | 474.549 |
| $MKT\_CAP_{j,t}/GDP_{j,t}$ | 0.016 | 0.014 | 0.397 | 0.001 | 0.095 | 30.964 | 194.280 |
| $GDP_{i,t}$ | 2.280 | 2.820 | 3.050 | 0.226 | 0.015 | -0.277 | 25.963 |
| $GDP_{j,t}$ | 2.760 | 2.720 | 3.080 | 0.226 | 0.015 | 4.598 | 22.578 |
| Firm Characteristics | | | | | | | |
| $ROA_{ik,t}$ | -0.009 | 0.005 | 0.067 | -0.002 | 0.105 | -145.805 | 22395.240 |
| $ROCE_{ik,t}$ | -0.029 | 0.072 | 0.013 | -0.001 | 0.005 | -162.637 | 26492.990 |
| $GPM_{i,k,t}$ | -0.006 | 0.003 | 0.296 | -0.042 | 0.033 | -99.897 | 12002.710 |
| $(Sales/GDP)_{ik,t}$ | 0.043 | 0.027 | 0.114 | -0.015 | 0.238 | 27.601 | 974.978 |
| $(Total\ Assets/GDP)_{i,k,t}$ | 0.016 | 0.004 | 0.413 | 0.001 | 0.093 | 20.928 | 646.720 |
| Bilateral Factors | | | | | | | |
| $Legal\_system_{i,j,t}$ | 0.563 | 1.000 | 1.000 | 0.000 | 0.496 | -0.253 | 1.064 |
| $Export_{i,j,t}/GDP_{i,t}$ | 0.063 | 0.015 | 0.203 | 0.023 | 0.012 | 5.181 | 47.846 |
| $Distance_{i,j,t}$ | 0.008 | 0.007 | 0.010 | 0.004 | 0.001 | -0.121 | 1.694 |
| $Com\_Region_{i,j,t}$ | 0.594 | 1.000 | 1.000 | 0.000 | 0.491 | -0.381 | 1.145 |
| $Com\_Language_{i,j,t}$ | 0.506 | 1.000 | 1.000 | 0.000 | 0.500 | -0.026 | 1.001 |
| $Contigious_{i,j,t}$ | 0.353 | 0.000 | 1.000 | 0.000 | 0.478 | 0.615 | 1.378 |

**Note**: Variable definitions and sources are given in Table 2

## Table 3b Descriptive Statistics for Industry Level Analysis

| Variables | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| $Share_{i,j,k,t}$ | 0.142 | 0.072 | 0.396 | 0.001 | 0.001 | 23.589 | 840.729 |
| $Con_{i,k,t}$ | 0.023 | 0.015 | 0.396 | 0.003 | 0.035 | 5.517 | 44.737 |
| $Con_{j,k,t}$ | 0.024 | 0.015 | 0.396 | 0.001 | 0.032 | 4.508 | 37.486 |
| Country Characteristics | | | | | | | |
| $MKT\_CAP_{i,t}/GDP_{i,t}$ | 0.100 | 0.100 | 0.400 | 0.007 | 0.051 | 0.976 | 5.430 |
| $MKT\_CAP_{j,t}/GDP_{j,t}$ | 0.138 | 0.123 | 0.397 | 0.118 | 0.924 | 0.542 | 2.267 |
| $GDP_{i,t}$ | 2.788 | 2.799 | 3.049 | 2.263 | 0.150 | -0.119 | 2.556 |
| $GDP_{j,t}$ | 2.751 | 2.727 | 3.049 | 2.263 | 0.150 | 0.385 | 2.641 |
| Industry Characteristics | | | | | | | |
| $ROA_{ik,t}$ | -0.019 | 0.058 | 0.578 | -0.163 | 0.015 | -102.784 | 11129.790 |
| $ROCE_{ik,t}$ | -0.589 | 0.906 | 0.130 | -0.077 | 0.067 | -114.393 | 13107.230 |
| $GPM_{i,k,t}$ | -0.011 | 0.004 | 0.298 | -0.415 | 0.045 | -72.563 | 6343.959 |
| $(Sales/GDP)_{ik,t}$ | 0.089 | 0.073 | 0.114 | -0.093 | 0.037 | 15.923 | 343.582 |
| $(Total\ Assets/GDP)_{i,k,t}$ | 0.326 | 0.013 | 0.446 | 0.000 | 0.001 | 14.181 | 301.607 |
| Bilateral Factors | | | | | | | |
| $Legal\_system_{i,j,t}$ | 0.531 | 1.000 | 1.000 | 0.000 | 0.499 | -0.126 | 1.016 |
| $Export_{i,j,t}/GDP_{i,t}$ | 0.078 | 0.020 | 0.002 | 0.002 | 0.014 | 4.981 | 42.141 |
| $Distance_{i,j,t}$ | 0.008 | 0.007 | 0.010 | 0.004 | 0.001 | -0.082 | 1.882 |
| $Com\_Region_{i,j,t}$ | 0.630 | 1.000 | 1.000 | 0.000 | 0.483 | -0.538 | 1.290 |
| $Com\_Language_{i,j,t}$ | 0.408 | 0.000 | 1.000 | 0.000 | 0.492 | 0.372 | 1.139 |
| $Contigious_{i,j,t}$ | 0.301 | 0.000 | 1.000 | 0.000 | 0.459 | 0.868 | 1.754 |

**Note**: Variable definitions and sources are given in Table 2

## Table 4 Determinants of cross-border listings: Analysis on Firm level

| **Variables** | ***(1)*** | ***(2)*** | ***(3)*** | ***(4)*** |
|---|---|---|---|---|
| $Con_{i,k,t}$ | 0.52*** | 0.04 | 0.01* | 0.05 |
| | (3.46) | (1.03) | (1.64) | (1.12) |
| $Con_{j,k,t}$ | -0.064*** | -0.08*** | -0.06*** | -0.07*** |
| | (-4.58) | (-4.77) | (-4.55) | (-4.31) |
| **Country Characteristics** | | | | |
| $MKT\_CAP_{i,t}/GDP_{i,t}$ | 0.01 | 0.01 | 0.01 | 0.02* |
| | (0.76) | (0.06) | (1.45) | (1.76) |
| $MKT\_CAP_{j,t}/GDP_{j,t}$ | -0.08*** | -0.08*** | -0.08*** | -0.11*** |
| | (-8.72) | (-8.58) | (-8.76) | (-8.76) |
| $GDP_{i,t}$ | 0.022*** | 0.019*** | -0.017*** | -0.014*** |
| | (8.07) | (6.30) | (-4.37) | (-3.69) |
| $GDP_{j,t}$ | -0.025*** | -0.031*** | -0.082 | -0.081 |
| | (-7.25) | (-6.53) | (-7.49) | (-7.66) |
| **Firm Characteristics** | | | | |
| $ROA_{ik,t}$ | 7.34*** | 11.64*** | 10.66*** | 11.27*** |
| | (3.91) | (5.15) | (5.34) | (5.25) |
| $ROCE_{ik,t}$ | 0.21** | 0.30*** | 0.15*** | 0.22*** |
| | (6.78) | (6.72) | (4.72) | (5.30) |
| $GPM_{k,t}$ | 0.30*** | -0.03 | 0.26*** | 0.12 |
| | (2.89) | (0.70) | (2.21) | (1.01) |
| $(Sales/GDP)_{ik,t}$ | 0.18*** | 0.19*** | 0.16*** | 0.18*** |
| | (3.22) | (3.45) | (3.05) | (3.48) |
| $(Total\ Assets/GDP)_{i,k,t}$ | 0.50*** | 0.50*** | 0.44*** | 0.45*** |
| | (7.52) | (7.76) | (6.87) | (7.16) |
| **Bilateral Factors** | | | | |
| $Legal\_system_{i,j}$ | -0.002 | -0.001 | -0.001 | -0.001 |
| | (-1.27) | (-1.03) | (-0.93) | (-1.61) |
| $Export_{i,j,t}/GDP_{i,t}$ | -0.16*** | -0.21*** | -0.26*** | -0.26*** |
| | (-4.32) | (-5.19) | (-5.59) | (-5.80) |
| $Distance_{i,j}$ | 0.20*** | 0.04*** | 0.02*** | 0.02*** |
| | (4.10) | (4.96) | (2.64) | (469) |
| $Com\_Region_{i,j}$ | 0.010*** | 0.001*** | 0.001*** | 0.001*** |
| | (6.40) | (6.13) | (3.41) | (3.36) |
| $Com\_Language_{i,j}$ | 0.002** | 0.001** | 0.001 | 0.001 |
| | (2.21) | (2.03) | (0.76) | (0.09) |
| $Contigious_{i,j}$ | -0.09*** | -0.07*** | -0.07* | -0.02** |
| | (-6.05) | (-7.18) | (-1.79) | (-1.96) |
| Adjusted $R^2$ | 0.07 | 0.08 | 0.08 | 0.08 |
| Observations | 11809 | 11809 | 11809 | 11809 |
| Time Fixed Effects | No | No | Yes | Yes |
| Industry Fixed Effects | No | Yes | No | Yes |

**Note:** Dependent variable ($Share_{i,j,k,t}$): The share of cross listings originated from *country i* at *country j* for firm *k* in total amount of cross listings of *country i*.*, ** and *** indicate that the coefficient is statistically significant at 10%, 5% and 1% respectively. Variable definitions are given in table 2. Heteroskedasticity and Autocorrelation corrected standard errors are used for the estimation. T-statistics are presented in parenthesis. The panel unit root test is implemented and all variables are found to be stationary.

## Table 5 Determinants of cross-border listings: Analysis on Industry level

| **Variables** | *(1)* | *(2)* | *(3)* | *(4)* |
|---|---|---|---|---|
| $Con_{i,k,t}$ | 0.008*** | 0.010*** | 0.009*** | 0.009*** |
| | (2.71) | (25.29) | (2.77) | (23.40) |
| $Con_{j,k,t}$ | -0.002** | -0.001*** | -0.002** | -0.001** |
| | (-2.18) | (-2.84) | (-2.29) | (-2.36) |
| **Country Characteristics** | | | | |
| $MKT\_CAP_{i,t}/GDP_{i,t}$ | -0.117*** | -0.063*** | -0.136*** | -0.153*** |
| | (-4.39) | (-2.64) | (-4.25) | (-5.81) |
| $MKT\_CAP_{j,t}/GDP_{j,t}$ | -0.080*** | -0.118*** | -0.107*** | -0.206*** |
| | (-6.91) | (-6.14) | (-7.32) | (-9.19) |
| $GDP_{i,t}$ | 0.037*** | 0.026*** | 0.019** | 0.006 |
| | (9.77) | (2.98)) | (2.34) | (0.06) |
| $GDP_{j,t}$ | -0.035*** | -0.026*** | -0.047*** | -0.103*** |
| | (-8.84) | (-2.71) | (-10.95) | (-5.22) |
| **Industry Characteristics** | | | | |
| $ROA_{ik,t}$ | -0.118*** | -0.027 | 0.002*** | 0.001 |
| | (-2.74) | (-0.07) | (-2.76) | (-0.09) |
| $ROCE_{ik,t}$ | -1.296 | -3.452 | -0.003 | 0.003 |
| | (-0.07) | (-0.06) | (-0.14) | (0.04) |
| $GPM_{k,t}$ | -0.956 | -1.161 | -0.001 | -0.001 |
| | (-0.81) | (-0.35) | (-0.65) | (-0.39) |
| $(Sales/GDP)_{ik,t}$ | -0.013 | -0.025 | -0.024** | -0.039 |
| | (-1.28) | (-0.58) | (-2.05) | (-0.95) |
| $(Total\ Assets/GDP)_{i,k,t}$ | -0.004 | 0.001 | -0.004 | -0.003 |
| | (-1.49) | (-0.04) | (-1.55) | (-0.20) |
| **Bilateral Factors** | | | | |
| $Legal\_system_{i,j}$ | -0.050* | -0.134*** | -0.049** | -0.061*** |
| | (-1.91) | (-4.57) | (-2.08) | (-2.93) |
| $Export_{i,j,t}/GDP_{i,t}$ | 0.102*** | 0.141* | 0.063 | 0.170* |
| | (2.93) | (1.71) | (1.30) | (1.96) |
| $Distance_{i,j}$ | 0.016 | 0.022 | 0.010 | 0.020 |
| | (1.31) | (1.32) | (0.83) | (1.20) |
| $Com\_Region_{i,j}$ | 0.188*** | 0.179*** | 0.142*** | 0.113*** |
| | (4.79) | (3.82) | (3.80) | (3.70) |
| $Com\_Language_{i,j}$ | -0.041*** | 0.002 | 0.002** | 0.001 |
| | (-2.76) | (0.49) | (-2.55) | (0.26) |
| $Contigious_{i,j}$ | -0.006*** | -0.006*** | -0.006*** | -0.005*** |
| | (-3.34) | (-3.40) | (-2.95) | (-3.64) |
| Adjusted $R^2$ | 0.12 | 0.17 | 0.13 | 0.18 |
| Observations | 5712 | 5712 | 5712 | 5712 |
| Time Fixed Effects | No | Yes | Yes | Yes |
| Industry Fixed Effects | No | No | No | Yes |

Note: Dependent variable ($\Delta Share_{i,j,k,t}$): the share of cross listings originated from *country i* at *country j* for firm *k* in total amount of cross listings of *country i*.*, ** and *** indicate that the coefficient is statistically significant at 10%, 5% and 1% respectively. We multiply the coefficients of Common language and common region by 1000 for presentation purposes. Variable definitions are given in table 2. Heteroskedasticity and Autocorrelation corrected standard errors are used for the estimation. T-statistics are presented in parenthesis. The panel unit root test is implemented and all variables are found to be stationary.

## Table 6 Determinants of cross-border listings: GMM Analysis on Firm level

| **Variables** | **(5)** | **(6)** |
|---|---|---|
| $\Delta Share_{i,j,k,t-1}$ | 0.113*** | -0.014*** |
| | (109.53) | (-10.68) |
| $\Delta Con_{i,k,t}$ | 0.073** | |
| | (2.08) | |
| $\Delta Con_{j,k,t}$ | -0.106 | |
| | (-1.24) | |
| **Country Characteristics** | | |
| $\Delta MKT\_CAP_{i,t}/GDP_{i,t}$ | -0.005** | -0.009*** |
| | (-2.32) | (-4.95) |
| $\Delta MKT\_CAP_{j,t}/GDP_{j,t}$ | -0.002 | 0.002 |
| | (-0.37) | (0.544) |
| $\Delta GDP_{i,t}$ | -0.021 | -0.008 |
| | (-1.16) | (-0.60) |
| $\Delta GDP_{j,t}$ | 0.007 | -0.001 |
| | (0.47) | (-10.11) |
| **Firm Characteristics** | | |
| $\Delta ROA_{ik,t}$ | 0.027*** | 0.030** |
| | (2.49) | (2.09) |
| $\Delta ROCE_{ik,t}$ | -0.006*** | -0.011*** |
| | (-2.88) | (-4.37) |
| $\Delta GPM_{k,t}$ | -0.001 | 0.004 |
| | (-0.08) | (0.20) |
| $\Delta(Sales/GDP)_{ik,t}$ | -0.194*** | 0.005 |
| | (-5.74) | (0.05) |
| $\Delta(Total\ Assets/GDP)_{i,k,t}$ | 0.098* | 0.064*** |
| | (4.00) | (3.24) |
| **Bilateral Factors** | | |
| $\Delta Export_{i,j,t}/GDP_{i,t}$ | -0.041 | -0.056*** |
| | (-1.37) | (-2.54) |
| AB (1) Test P-Value | 0.40 | 0.35 |
| AB (2) Test P-Value | 0.31 | 0.92 |
| Sargan Statistics P-value | 0.16 | 0.11 |
| **No. of Observations** | 10289 | 15041 |

**Note:** Dependent variable ($\Delta Share_{i,j,k,t}$): the share of cross listings originated from *country i* at *country j* for firm *k* in total amount of cross listings of *country i*.*, ** and *** indicate that the coefficient is statistically significant at 10%, 5% and 1% respectively. T-statistics are presented in parenthesis. First Difference GMM model with white period instrument weighting matrix are implemented providing heteroscedasticity consistent estimates of the covariance matrix.

## Table 7 Determinants of cross-border listings: GMM Analysis on Industry level

| **Variables** | **(5)** | **(6)** |
|---|---|---|
| $\Delta Share_{i,j,k,t-1}$ | 0.129*** | 0.265*** |
| | (117.34) | (47.18) |
| $\Delta Con_{i,k,t}$ | 0.144** | |
| | (2.31) | |
| $\Delta Con_{j,k,t}$ | -0.074 | |
| | (-0.36) | |
| **Country Characteristics** | | |
| $\Delta MKT\_CAP_{i,t}/GDP_{i,t}$ | -0.009** | -.012*** |
| | (-2.11) | (-3.16) |
| $\Delta MKT\_CAP_{j,t}/GDP_{j,t}$ | -0.001 | 0.006 |
| | (-6.48) | (0.09) |
| $\Delta GDP_{i,t}$ | -0.031 | -0.014 |
| | (-110) | (-0.70) |
| $\Delta GDP_{j,t}$ | 0.006 | 0.006 |
| | (0.23) | (0.29) |
| **Industry Characteristics** | | |
| $\Delta ROA_{ik,t}$ | 0.001 | -0.006* |
| | (0.99) | (-0.82) |
| $\Delta ROCE_{ik,t}$ | -0.003 | -0.008** |
| | (-1.13) | (-2.40) |
| $\Delta GPM_{k,t}$ | -0.029* | -0.068 |
| | (-1.84) | (-0.91) |
| $\Delta(Sales/GDP)_{ik,t}$ | -0.060 | -0.109** |
| | (-0.85) | (-2.27) |
| $\Delta(Total\ Assets/GDP)_{i,k,t}$ | 0.002 | 0.009* |
| | (0.51) | (1.80) |
| **Bilateral Factors** | | |
| $\Delta Export_{i,j,t}/GDP_{i,t}$ | -0.053** | -.022*** |
| | (-2.06) | (-1.13) |
| AB (1) Test P-Value | 0.34 | 0.33 |
| AB (2) Test P-Value | 0.48 | 0.32 |
| Sargan Statistics P-value | 0.10 | 0.11 |
| **No. of Observations** | 6057 | 8434 |

**Note:** Dependent variable ($\Delta Share_{i,j,k,t}$): The share of cross listings originated from *country i* at *country j* for firm *k* in total amount of cross listings of *country i*.*, ** and *** indicate that the coefficient is statistically significant at 10%, 5% and 1% respectively. T-statistics are presented in parenthesis. First Difference GMM model with white period instrument weighting matrix are implemented providing heteroscedasticity consistent estimates of the covariance matrix.

**Table 8 Country list**

| *country set i* | *country set j* |
|---|---|
| Australia | Greece |
| Austria | Hungary |
| Belgium | Iceland |
| Canada | Ireland |
| Chile | Israel |
| Czech Republic | Italy |
| Denmark | Japan |
| Estonia | Korea |
| Finland | Luxembourg |
| France | Mexico |
| Germany | Australia |
| Greece | Austria |
| Hungary | Belgium |
| Iceland | Canada |
| Ireland | Chile |
| Israel | Czech Republic |
| Italy | Denmark |
| Japan | Estonia |
| Korea | Finland |
| Luxembourg | France |
| Mexico | Netherlands |
| Netherlands | New Zealand |
| New Zealand | Norway |
| Norway | Poland |
| Poland | Portugal |
| Portugal | Spain |
| Slovak Republic | Sweden |
| Slovenia | Switzerland |
| Spain | Turkey |
| Sweden | United Kingdom |
| Switzerland | United States |
| Turkey | |
| United Kingdom | |