Essays on Corporate Cross-listing Decisions

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ABSTRACT

The decision to cross-list and the associated outcomes on corporate structure, strategies, and decisions is well-advanced. The reported outcomes range from access to foreign capital, broader analyst coverage, better information environment, improved liquidity, better corporate governance, and enhanced revenue. Such outcomes are said to motivate the cross-listing decision and are significantly associated with corporate and market characteristics. However, studies on how dynamics in corporate and market characteristics interact to drive cross-listing decisions are limited. Again, studies on the subsequent impact of cross-listing on other corporate decisions and strategies are lacking. This thesis expands the existing literature by providing three essays on how dynamics in firm and market characteristics influence cross-listing decisions. It also shows how the associated outcomes of cross-listing impact ensuing corporate decisions and strategies.

The first study focuses on the dividend smoothing strategies of foreign firms. It examines how commitment to full disclosure through cross-listing in the US influence dividend smoothing behavior. While questions on the determinants and channels of dividend smoothing are not new, how cross-listing impacts these determinants and channels have not yet been studied. The study is based on the premise that cross-listing in the US signals commitment to full disclosure. Also, it is typically associated with improved transparency and increased investor and analyst coverage: reducing information asymmetry and agency conflicts. Again, it is widely argued that the levels of information asymmetry and agency cost significantly influence dividend smoothing practices, while investment and debt are among the primary channels for dividend smoothing practices. We, therefore, examine how commitment to full disclosure and improved transparency due to cross-listing impacts the dividend smoothing strategies of foreign firms. We adopt two well-established approaches: Lintner's partial

adjustment model, and a variance decomposition approach to study the dividend policies of firms after cross-listing.

The results show increased dividend smoothing after cross-listing with significant sectoral variations in dividend smoothing strategies. We also document that firms from developing economies exhibit a lower increase in dividend smoothing after cross-listing compared to firms from developed economies. Adopting a variance decomposition approach, we find evidence of essential differences in the use of debt and investment channels before and after cross-listing to smooth net income shocks. Overall, our findings suggest that managers of cross-listed firms are motivated to ensure minimal fluctuations to dividends due to the information content of dividend payment. The results also indicate that firms use financing decisions to keep dividends smooth.

The second study focuses on how market characteristics interact with firm characteristics to influence cross-listing decisions and the choice of the host market. The study examines how the specialization in the output of the local and host markets impacts cross-listing decisions and the selection of the host market in the presence of other firm-level characteristics. This study builds on the existing macroeconomic literature that maintains that economies are specialized in their output, suggesting potential high competition for funding, among other forms of competition. Given this basis, we propose two arguments. One, specialization in national output could encourage firms to seek funds from other foreign markets through cross-listing. Two, specialization in national output could make the local market attractive to international firms.

We implement a gravity model on a sample of 1779 firms from OECD countries for 20 years and find that specialization in output in the local and host markets significantly influences the decision to cross-list and the choice of the host market. Using firm and industry-level data,

we report that firms from countries that are specialized in specific industries undertake more cross-listing compared to firms from markets that are not. Interestingly, we document that firms from specialized markets cross-list to markets that are less specialized in the same industry. While the findings suggest that firms seek diversification of funding opportunities in the cross-listing decision and the choice of the host market, they also indicate the weakening of the gravity restrictions in line with recent studies.

The role of market characteristics in influencing corporate decisions and strategies is conventional. However, recent studies document a growing influence of policy uncertainty on corporate decisions. The third essay builds on this premise and examines how economic policy uncertainty (EPU) in the local and global markets impacts corporate cross-listing decisions. It employs firm- and country-level motivated by the availability of the EPU data. The examination commences with the implementation of an initial Granger Causality test. The study then adopts two contemporary approaches; a Quantile on Quantile Regression approach, and a Wavelet Coherence approach to allow a comprehensive understanding of the relationship.

The results show that local and global EPU influence the cross-listing decisions of firms, with a more substantial influence on firms from smaller domestic markets. The empirical evidence suggests that firms from smaller local markets pursue more cross-listing in the face of high local EPU and reduce or avoid cross-listing during periods of high global EPU. The Quantile on Quantile Regression approach and the Wavelet Coherence approach document important dynamics between EPU and cross-listing decisions at different frequencies and periods, with a stronger relationship reported at higher frequencies of EPU. In addition to contributing to the existing literature, our findings suggest that policy transparency could have important implications for current and future corporate decisions.

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TABLE OF CONTENTS

List of Tables

List of Figures

LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
EPU	Economic Policy Uncertainty
OECD	Organization for Economic Cooperation and Development
US	United States of America
CPI	Corruption Perception Index
UK	United Kingdom
QQR	Quantile on Quantile Regression
WC	Wavelet Coherence
OLS	Ordinary Least Square
ADF	Augmented Dickey-Fuller
BNY	Bank of New York
GMM	Generalized Method of Moments
NI	Net Income
MB	Market to Book Value
STAN	Structural Analysis
NYSE	New York Stock Exchange
SOA	Speed of Adjustment
CL	Cross-listing
WDI	World Development Indicator
ADR	American Depository Receipt
GDR	Global Depository Receipt
ROA	Return on Assets
ROCE	Return on Capital Employed
GPM	Gross Profit Margin

SEC	Securities and Exchange Commission
HAC	Heteroskedasticity and Autocorrelation Consistent
ETF	Exchange Traded Fund

CHAPTER ONE

Introduction

This chapter outlines the three main issues discussed in this thesis. It also provides the motivation and contributions of these discussions to the existing literature. Next, the chapter highlights the research outputs from the three essays. This chapter concludes by providing an outline of the thesis.

1.1 Introduction

The motivation to cross-list and the choice of the host market remains an important research question as global financial markets become increasingly integrated. Managers often report that cross-listing offers investors the possibility of foreign investment while providing significant positive market outcomes for firms (e.g., Fanto and Karmel, 1997 and Karolyi, 1998). A large body of literature examines these positive market outcomes. They show that cross-listed firms exhibit evidence of increased analyst coverage, better information environment, improved liquidity, better corporate governance, and improved revenue compared to their locally listed counterparts[1]. While there is limited evidence on the permanence of some of these outcomes, these outcomes suggest that the motivation to cross-list and the choice of the host market go beyond raising foreign capital (e.g., Foerster, and Karolyi, 1999, and Karolyi, 2006).

[1] The literature provides detailed examination of these outcomes (e.g., Bacidore, and Sofianos, 2002, Berkman and Nguyen, 2010, Baker, Nofsinger, and Weaver, 2002, Bris, Cantale, Hrnjic, and Nishiotis, 2012, Pagano, Röell, and Zechner, 2002, Dodd, 2013, King and Segal, 2003, Karolyi 2012, Li, Brockman, and Zurbruegg, 2015)

The extant cross-listing literature discusses what motivates the cross-listing decision and the choice of the host market. A large number of studies show that market characteristics in both the local and host markets interact with firm features to motivate the cross-listing decision and the choice of the host market. However, there is limited consensus on the direction of the impact of market characteristics. The literature proposes two main arguments. The first argument suggests that the decision to cross-list and the choice of the host market is motivated by poorly functioning local markets, with inadequate minority shareholder protection and inefficient regulatory systems (e.g., Karolyi 2004, and Korczak and Korczak, 2013). This argument builds on the premise that cross-listing provides an option to list on host markets with more robust frameworks. These studies emphasize the significance of market characteristics in the decision to cross-list and provide evidence that firms might be seeking positive market outcomes associated with more robust markets.

The second argument suggests that high-income economies with better macro policies and efficient legal systems engage in more cross-listing compared to developing economies. This proposition is argued from an investor perspective. It shows that investors in the host market are likely to patronize firms from markets with good fundamentals (e.g., Claessens, Klingebiel, and Schmukler, 2006). This line of argument suggests that firms from markets with sound fundamentals cross-list to meet the demands of investors. While these two strands of arguments focus on market development and may not provide consensual conclusions on how market fundamentals drive cross-listing decisions, they point to the relevance of market characteristics in the decision to cross-list and the choice of the host market.

Prior studies suggest that government policies define market characteristics and tend to have a substantial impact on corporate decisions and strategies. However, recent studies argue that uncertainties about government policies have a similar effect, given that government policies drive market characteristics. These studies cite topical international events and

national policy debates, especially during the US election, the BREXIT referendum, tax reform debates in the UK, US-China trade disagreements, among others. The literature further indicates that such events contribute significantly to high uncertainty. Such uncertainties have significant implications for corporate decisions and operations. For example, they show that periods of high policy uncertainty discourage corporate investments and mergers and acquisitions (e.g., Kang, Lee, and Ratti, 2014, Bonaime, Gulen, and Ion 2018, and Gulen and Ion, 2015). Despite this evidence, these studies focus on corporate investments and mergers and acquisitions with cross-listing getting less attention. Unlike other organizational strategies and financing decisions, cross-listings are predominantly motivated by market characteristics, making policy uncertainty in both the local and host markets relevant to the decision to cross-list and the choice of the host market.

Recent revelations suggest that the existing empirical evidence is insufficient in addressing the motives for cross-listing and their subsequent impact on corporate decisions and strategies. First, there is evidence of an increase in the number of firms cross-listing without raising foreign capital[2]. Second, there is evidence of significant growth in cross-listings to specific host markets, which might suggest the existence of peculiar market benefits despite global market integration[3].

Given this evidence, the three essays presented in this thesis provide an examination of two critical issues. First, the thesis examines how cross-listing affects corporate decisions and strategies. Second, it investigates whether dynamics in market characteristics from both macroeconomic and policy perspectives influence cross-listing decisions.

[2] See for example, Licht (2003), and Sarkissian and Schill (2016)
[3] Recent discussions by Abdallah and Abdallah (2019), Dodd (2013), and Sarkissian and Schill (2016) report an increase in cross-listings with strong preference for US markets.

The first essay, presented in chapter 2, investigates how and to what extent commitment to full disclosure and improved transparency due to cross-listing impacts the dividend smoothing strategies of foreign firms. For foreign firms, cross-listing in the US may signal a commitment to full disclosure and transparency, in line with the bonding hypothesis. The bonding hypothesis proposes that firms from countries with weak governance fundamentals cross-list to markets with robust governance mechanisms to signal their commitment to full disclosure and strict regulatory requirements (Coffee, 1999, 2002, and Stulz, 1999). Accordingly, a well-documented permanent outcome of cross-listing is improved information environment, minority shareholder protection, and transparency, especially when firms cross-list in developed markets (e.g., Esqueda, 2016, Li, Brockman, and Zurbruegg, 2015, and Licht, 2003). The extant cross-listing literature explains that compared to developing markets, developed markets tend to have more stringent disclosure and regulatory requirements. Consequently, listing on such markets signals managers' willingness to disclose more information and subject themselves to more strict supervision, thus, becoming more transparent.

Since the seminal studies by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000), an extensive literature associates dividend strategies with corporate transparency (Adjaoud and Ben-Amar, 2010, Hong Kong and Mainland, Zhang, 2008, Lin, Chen, and Tsai, 2017, Price, Román, and Rountree, 2011, and Sharif and Lai, 2015). However, the question of whether improved transparency affects payout strategies has received limited attention. While recent studies examine how improved transparency due to cross-listing impacts dividend policy, there are no empirical studies on the impact of enhanced transparency on dividend smoothing strategies[4]. The first essay mitigates this gap by examining whether the commitment to full

[4] Petrasek (2012) and Esqueda (2016) provide some insight on how improvements in transparency affect dividends and report an increase in dividends after cross-listing.

disclosure and improved transparency due to cross-listing impacts dividend smoothing strategies. To this end, the study uses a consolidation of data from the Bank of New York Mellon, J.P. Morgan, and Citibank depository receipts websites of self-initiated cross-listings from 1995 to 2016. The study seeks to answer two critical questions. One, whether and to what extent cross-listing affects dividend smoothing practices of firms. Two, to identify the dynamics in the channels of dividend smoothing after cross-listing.

Chapter 3 focuses on the role of market characteristics in the decision to cross-list and the choice of the host market. In particular, Chapter 3 is closely related to the strand of literature that argues a strong relationship between macroeconomic factors and cross-listing decisions. However, unlike previous studies, Chapter 3 investigates how specialization in output in both the local and host markets influences the decision to cross-list and the choice of the host market. The chapter builds on existing evidence that economies are specialized in output and proposes two arguments. First, specialization in output may suggest competition among firms that operate in that industry in all spheres, including competition for funds. Such competition is likely to drive firms to seek other sources of funding through listing on foreign markets, similar to the economics literature on internationalization (e.g., Mayer and Ottaviano, 2008 and Aiginger and Davies, 2004). Second, and in line with the international economics literature, we propose that firms may seek cross-listing in countries that are specialized in a given industry. This proposition follows the assertion of Pagano *et al.* (2002). They assert that firms are likely to cross-list in markets with a similar setup and positive market outcomes as their competitors to gain the same competitive edge as other competitors. The two propositions imply that firms may seek cross-listing to compete less for funding in the local market or to obtain additional benefits in specialized foreign markets.

The essay in chapter 3 adopts a gravity model setup, which enables us to control for bilateral linkages between the local and host markets and their economic performance. The

dependent variable, the share of cross-listing, is expressed as a ratio of the value of cross-listings from a given local market listed in a given host market according to their respective industries. We initially undertake a firm-level analysis and then aggregate the data to perform an industry-level analysis to ascertain any industry-level trends. The industry-level analysis is motivated by the well-established phenomenon that some industries are generally attracted to specific markets (Bancel, Kalimipalli, and Mittoo, 2004).

Chapter 4 discusses policy uncertainty and how it influences firm decisions and strategies. The chapter is motivated by the evidence that government policies define market characteristics. Several recent studies show the relevance of policy uncertainty for corporate decisions and strategies. Of particular note are those on economic policy uncertainty. Different from other forms of policy uncertainty, economic policy uncertainty is widely adopted as a proxy for the general economic confidence levels in a given country by several studies (e.g., Antonakakis, Chatziantoniou, and Filis, 2014, Baker, Bloom, and Davis, 2016, Brogaard and Detzel, 2015, and Colombo, 2013). Previous studies show that periods of high economic policy uncertainty have adverse effects on corporate operations and growth decisions. These include investments, capital structure and mergers, and acquisitions. Chapter 4 draws from this background to examine how local and global economic policy uncertainties influence corporate cross-listing decisions.

The examination in Chapter 4 begins with finding a suitable measure of economic policy uncertainty. We resort to the monthly EPU index of Baker *et al.* (2016) for 13 countries for the period 1990 to 2016 to examine this relationship. Baker *et al.* (2016) construct a weighted average frequency count of news articles that contain words that connote uncertainty about a country for each month. We perform a Granger Causality test and then adopt a Quantile on Quantile Regression (QQR) approach, and a Wavelet Coherence (WC) approach to investigate how local and global EPU influence corporate cross-listing decisions. These

approaches help us to ascertain an in-depth relationship between cross-listing decisions and local and global EPU.

1.2 Main Findings and Contributions to Existing Literature

This section presents the main findings and research contributions of each of the essays presented in Chapters 2, 3, and 4.

Chapter 2 begins by discussing the association between transparency and dividend smoothing strategies. It asks the question of whether the commitment to full disclosure and improved transparency due to cross-listing impact corporate dividend smoothing. Our sample consists of cross-listings in the US, given the well-reported transparency and disclosure outcomes in the literature (e.g., Boubakri, El Ghoul, Wang, Guedhami, and Kwok, 2016, Li, Brockman, and Zurbruegg, 2015, and Licht, 2003). We adopt Lintner's partial adjustment model, which enables us to measure the speed of adjustment for the sample firms. We focus on the change in the speed of adjustment for the overall period and the period after cross-listing. This examination extends the existing knowledge in both the cross-listing and the corporate finance literature.

We document an increase in dividend smoothing after cross-listing in the US. This finding relates to the signaling theory of dividend payment, which suggests that dividends communicate information about future earnings. Novel to the literature, we ascertain how the economic development of the local market impacts dividend smoothing strategies after cross-listing. We report that firms from developing economies exhibit a 7.93% increase in payout smoothing after cross-listing compared to the 10.27% increase for firms from developed economies. Findings from the sectoral analysis show an increase in dividend smoothing of all industries except Agriculture, Forestry and Fishing, Electricity and Gas, Administrative, and

Support Service activities industries. This finding follows the extant dividend smoothing literature that suggests significant sectoral variations in dividend smoothing strategies (Chemmanur, He, Hu, and Liu, 2010, Hoang and Hoxha, 2016, Javakhadze, Ferris, and Sen, 2014, and Leary and Michaely, 2011)

The variance decomposition approach to smoothing is widely used in both the finance and economics literature[5]. The adoption of this approach enables us to examine the channels of dividend smoothing at two levels; the aggregate and market levels. The findings show that cross-listed firms intensify the use of debts and investments in smoothing shocks to net income, keeping dividend smooth. We report that firms from developing countries absorb income shocks using the debt channel less effectively than investment.

The contribution of chapter 2 is four-fold. First, it provides the first insight into how improvements in transparency due to cross-listing affect dividend smoothing strategies. Second, it shows how local market development mitigates or fosters dividend smoothing intensity. This contribution further adds to the existing literature on the relationship between investor sophistication and corporate decisions. Third, unlike previous studies that focus on dividend smoothing channels for different industries, the study offers new evidence on payout smoothing channels and their dynamics at the market level. Fourth, it shows the link between payout strategies and other financing decisions.

The essay presented in Chapter 3 focuses on how specialization in output in the local and host markets interacts with the firm and other market characteristics to impact the bilateral cross-listing decision and the choice of the host market. The essay is related to the macroeconomic determinants of cross-listing, which show that market development and

[5] (see e.g., Asdrubali, Sørensen, and Yosha, 1996, Balli, Basher, and Balli, 2013, Balli, Basher, and Louis, 2013, Hoang and Hoxha, 2016, and Sørensen and Yosha, 1998)

economic indicators are significant factors in the cross-listing decision[6]. Despite the reasonable number of studies on the role of market characteristics, a vital market characteristic, specialization in output, is ignored (e.g., Bikker and Haaf 2002, and Aiginger and Davies 2004).

We adopt a gravity model that allows us to control for bilateral linkages between the source market and their host counterparts. The empirical findings suggest that specialization in output in both the local and host markets positively and significantly influences cross-listing decisions. Given the established sectoral variation in the choice of the host market, we provide both firm and industry-level examination of this relationship. While both analyses show similar results, we report that firms seek cross-listing in host markets that less specialized in the same industry as their local market. There is mostly a consensus on the positive impact of bilateral linkages in the bilateral asset flow literature. By contrast, we document a violation of the gravity/proximity arguments in the choice of the host market for cross-listing[7].

Chapter 3 contributes to the literature by providing a robust examination of the association between market specialization in output and the cross-listing decision and choice of the host market. It also offers new evidence on the weakening of the gravity rules, as shown in recent studies (e.g., Hioki, Hewings, and Okamoto, 2005, and Melitz, 2007).

Chapter 4 critically examines the impact of economic policy uncertainty (EPU) in the local and host market on the cross-listing decisions of firms. So far, existing studies show the negative effect of local EPU on corporate decisions, including investments and mergers and acquisitions, among others (e.g., Handley and Limao, 2015 and Gulen and Ion, 2015). Unlike previous studies, Chapter 4 provides an international perspective to this impact, while showing

[6] See for example Karolyi (2004) and Korczak and Korczak (2013) who provide detailed analysis on the subject.
[7] See for example, Frenkel, Funke, Stadtmann (2004), Aviat and Coeurdacier (2007) and Lane and Milesi-Ferretti (2008)

how local and global policy uncertainty impacts corporate decisions. Results from an initial estimation of the Granger Causality suggests causality between cross-listing and local and global EPU. However, the results are weak.

We address this by implementing two contemporary approaches; a quantile on quantile approach and a wavelet coherence approach. These approaches help us to ascertain an in-depth relationship between cross-listing decisions and local and global EPU. Results from these approaches show that periods of high local economic policy uncertainty leads to increased cross-listing while periods of high global economic policy uncertainty discourages cross-listing. These results are related to recent studies that document a negative impact of local EPU on firm expansionary decisions (e.g., Bonaime, Gulen, and Ion, 2018, Wang, Chen, and Huang, 2014, and Zhang, Han, Pan, and Huang, 2015). However, the current study differentiates itself from recent studies by providing both a time-varying and market-related perspective. The findings suggest that smaller economies respond more to local EPU by intensifying cross-listing during high EPU periods compared to their larger counterparts. Again the results show this relationship is time-variant and dynamic across different quantiles of both EPUs and cross-listing decisions.

Chapter 4 makes essential contributions to the literature. It offers a thorough examination of how policy uncertainty impacts the decision to cross-list. The results provide new evidence on the influence of economic policy uncertainty on corporate decisions. However, different from previous studies, it offers an international perspective to the discussion, while adopting contemporary approaches. The findings suggest that the relationship between policy uncertainty and firm decisions is dynamic across different countries, time, and frequencies. The essay also highlights the relevance of market development in mitigating policy uncertainty shocks. The empirical results suggest that though policy uncertainty may be inevitable, transparency about such policies could be of importance to corporate decisions

1.3 Research Outputs from the thesis

1.3.1 Essay 1

A revised version of the first essay from the thesis is under review with the *Journal of Corporate Finance.*

1.3.2 Essay 2

The second essay is under review with the *Journal of International Money and Finance*. It was presented in the following conferences:

a. The Auckland Finance Meeting, Queenstown, New Zealand in December 2017 under the title "Cross-listing decisions of firms and output specialization."
b. The New Zealand Association of Economists Conference, Victoria University of Wellington, Wellington, New Zealand, in June 2017 under the title "International cross-listing and output orientation: evidence from OECD countries."

1.3.3 Essay 3

The final essay is under review with the *North American Journal of Economics and Finance*. The essay was presented in the 32nd Australiasian Banking and Finance conference held in Sydney, Australia, in December 2019 under the title " Cross-listing flows under uncertainty: international perspective."

1.4 Structure of the Thesis

The thesis contains three essays, which discuss the determinants of cross-listing decisions and the choice of the host market and the impact of cross-listing on subsequent corporate decisions and strategies. Chapter 2 presents the first essay, which examines the impact of improved transparency due to cross-listing on corporate smoothing strategies. Essay two is presented in Chapter 3 and investigates how specialization in output in the local and host markets influences the cross-listing under a gravity model setup. Essay three follows in Chapter 4 and discusses how economic policy uncertainty in both the local and global markets affect cross-listing decisions of firms. Chapter 5 concludes the thesis and offers key findings and provide policy implications of the outcomes while highlighting potential future research areas.

CHAPTER TWO

Bonding Hypothesis: A dividend smoothing perspective

This study examines how and to what extent the commitment to full disclosure and improved transparency due to cross-listing impacts the dividend smoothing strategies of foreign firms. We report a 9.47% increase in the overall payout smoothing of foreign firms after cross-listing with significant dynamics in sectoral payout smoothing. We also document that firms from developing economies exhibit a 7.93% increase in payout smoothing after cross-listing compared to the 10.27% increase for firms from developed economies. Results from the variance decomposition approach show evidence of essential dynamics in the use of debt and investment channels after cross-listing at both market and industry levels. Overall, our findings suggest that managers of cross-listed firms are motivated to ensure minimal fluctuations to dividend payouts due to the information content of dividend payment. Managers achieve stable dividends by varying debt and investment.

2.1 Introduction

Dividend policies and their underlining determinants remain a puzzle in the finance literature. Existing studies inconclusively contend dividend payments citing its relevance or otherwise to firm value. For example, while Baker, Veit, and Powell (2001), and Auerbach and Hassett (2006) argue the importance of dividend payments to investors in firm valuation, Miller and Modigliani (1961) demonstrate the opposite. Despite this contention, firms continue to pay dividends and are sometimes reluctant to cut dividends, even at the expense of investment opportunities and increased debt ratios. Lintner (1956) presented the first empirical evidence of dividend smoothing, finding that managers prefer paying steady dividends with periodic

adjustments aimed at achieving a target dividend payout. Several papers examine this phenomenon and provide supporting evidence[8] and outline debts and investments as the main dividend smoothing channels (e.g., Lambrecht and Myers, 2012, Hoang and Hoxha, 2016, and Wu 2018). Of interest is the study by Leary and Michaely (2011), who examine the determinants of dividend payout smoothing of US firms. Leary and Michaely (LM) show that firms with low information asymmetry and high analyst coverage smooth dividend payouts more. Their paper explains that with low information asymmetry (high transparency) and analyst coverage, firms become more concerned about large volatilities in dividend payouts due to the information content of cash flow related news. Consequently, firms may smooth dividend payouts to minimize market reactions or expectations. If transparency and analyst coverage is key to high payout smoothing, should improvements in transparency via cross-listing impact payout smoothing strategies of foreign firms?

Cross-listing in the US may signal a commitment to full disclosure and transparency, in line with the bonding hypothesis, and suggests adherence to higher mandatory disclosure requirements for foreign firms (e.g., Fanto and Karmel, 1997 and Coffee, 2002). For instance, cross-listing on Nasdaq, AMEX, or NYSE requires that firms become subject to stringent laws and supervision, including meeting higher disclosure and reporting requirements. Accordingly, US cross-listed firms exhibit increased transparency and disclosure compared to their locally listed peers after cross-listing (Domowitz, Glen, and Madhavan, 1998, and Lang, Lins, and Miller, 2003). As foreign firms signal a commitment to full disclosure and become more transparent by listing in the US, we ask whether and to what extent such improvements impact their dividend smoothing strategies.

[8] For example, Chemmanur, He, Hu, and Liu (2010) compare the dividend payout smoothing of US and Hong Kong firms and report higher payout smoothing by US firms compared to their Hong Kong counterparts

While recent literature such as Petrasek (2012) and Esqueda (2016) show interest in how improved disclosure and transparency due to cross-listing impact dividends, there is little empirical research on the effect commitment to full disclosure and enhanced transparency have on dividend smoothing. Petrasek (2012) shows that firms increase cash payouts by about 9% of earnings after cross-listing on markets with higher disclosure and corporate governance requirements. He argues that this change is more significant for firms from countries with both weak shareholder protection and corporate governance mechanisms. However, the sustainability of such an increase remains a gap. We fill this gap.

We posit in line with Petrasek (2012)'s argument and the bonding hypothesis that stringent laws and supervision in the US equity markets promote improved transparency. Besides, improved media coverage and analyst following might reflect in increased dividend payouts as firms might want to maintain investor attention through high dividends. On the other hand, increased access to funds could result in cross-listed firms being able to improve their profitability, leading to increased dividends. Notwithstanding these potential outcomes, we anticipate that these increases will not be permanent and is only sustainable until the host market familiarizes with the newly cross-listed firm[9]. We expect that the host market is likely to react to any further cash flow related news similar to the reaction for local firms, after this stage. We also expect that managers might adjust debt and investment to maintain stable dividends in line with budget constraints.

The determinants of corporate dividend policy are numerous, dating back to those of Miller and Modigliani (1961). Several theories offer explanations to firms' dividend policies. These include the signaling and agency cost theories (information content of dividend). For example, Lintner (1956) and Fama and Babiak (1968) show that managers smooth dividends

[9] After cross-listing, it takes time for the market to have a true impression of the firm and its value

to mitigate agency problems. To achieve this, firms target a long-term desired payout ratio and make episodic adjustments to dividends. Allen, Bernardo, and Welch (2000) find that firms facing more significant agency conflicts engage smooth dividends compared to firms that do not face similar levels of agency conflicts. Leary and Michaely (2011) document that age, size, earnings, and return volatility and analyst forecasts determine payout smoothing practices. They indicate that dividend smoothing is higher among firms that are exposed to agency conflicts. These studies, among others, summarize the arguments for the signaling and agency cost theories of dividend payouts. For foreign firms, cross-listing in the US may signal a commitment to full disclosure and transparency, which should significantly reduce agency conflicts. Another relatively similar explanation for dividend smoothing is the level of information asymmetry. For example, Guttman, Kadan, and Kandel (2010) show that levels of informational asymmetry encourage (discourage) dividend smoothing, aimed at enabling investors to assess the real earnings ability and value of the firm. Leary and Michaely (2011) test this phenomenon and show that firms with low information asymmetry smooth payouts more. It is clear that the level of information asymmetry is relevant to the dividend smoothing discussion.

The corporate finance literature shows that managers use other financing decisions to ensure smooth dividends. An extensive literature shows that managers tend to either increase borrowings, sacrifice investment, or a combination of both to ensure stable dividends (Myers and Majluf, 1984, and Brav et al., 2005). Myers and Majluf (1984) provide support for this assertion and show that to keep dividends stable, firms initially engage internal funds (sacrifice investment) and increase external borrowings. Campello, Giambona, Graham, and Harvey (2011) use a unique dataset to examine the reaction of firms to severe net income shocks and report that firms increase borrowing during periods of severe net income shocks and sacrifice investments. Lambrecht and Myers (2012) propose that for a given investment policy, shocks

to net income are absorbed using debt to keep dividends smooth. Hoang and Hoxha (2016) empirically test this phenomenon using a variance decomposition approach. They show that investment and debt together absorb about 97% of shocks to net income, while dividends reflect the remaining 3%. For cross-listed firms, we anticipate a potential change in their dividend smoothing strategies for two reasons. The market may view volatilities in dividend payout as earnings volatility and high risk. Two, absorbing shocks by increasing debt may be considered to be financial instability, while sacrificing investment may signal a lack of prospects

Based on this background, we empirically test the dividend smoothing of foreign firms after cross-listing. Accordingly, we contribute to the dividend policy discussion in three ways. We examine how commitment to full disclosure and transparency due to cross-listing impacts the dividend smoothing of foreign firms. We then test whether this impact varies across different sectors and market developments. We also identify the channels of dividend smoothing at both aggregate and sectoral levels.

We collect data on all cross-listed firms in the US equity markets from the Bank of New York Mellon, J.P. Morgan, and Citibank depository receipts websites. These depositories provide depository services to all American Depository Receipts (ADRs) for non-US firms. The dataset indicates the cross-listing dates and industry classification. In line with Javakhadze, Ferris, and Sen (2014), we only consider firms that have been cross-listed for at least five years before 2017 and pay dividends for at least five years. Our final sample consists of 893 firms.

This study adopts Lintner's partial adjustment model and a variance decomposition approach and shows a significant increase in dividend smoothing after cross-listing. In particular, we indicate intensified payout smoothing for firms from developed countries compared to those from developing countries. We also find sectoral variations in the extent of payout smoothing with firms from the Agriculture, Forestry, and Fishing, Electricity, Gas

steam, and Air conditioning activities and Administrative and Support services showing evidence of reduced dividend smoothing after cross-listing.

Results from the variance decomposition approach show three essential findings. We show that foreign firms intensify the use of debt and investment in smoothing shocks to net income, keeping dividends smooth. Consequently, we observe a 9% reduction in the unabsorbed net income shock after cross-listing compared to 14% before cross-listing. We find that firms from developing countries absorb income shocks using the debt channel less effectively than investment. We also observe significant differences in sectoral response to net income shocks after cross-listing. We report substantial decreases in the unabsorbed shocks to net income for all industries except for the Agriculture, Forestry and Fishing, Gas steam, and Air conditioning activities and Accommodation and Food Service activities industries.

Overall, this study provides the first insight into the impact of cross-listing on developed markets on the dividend smoothing strategies of foreign firms. It shows the extent of dividend smoothing, highlight how managers increase debt and adjust investment to keep dividends stable in response to net income shocks.

The remainder of this paper is organized as follows. Recent discussions and related literature are presented in section 2. Section 3 describes the data, summary statistics. Section 4 presents methodologies and estimation results, while Section 5 shows the conclusions and implications of this paper.

2.2 Related Literature

2.2.1 Cross-listing and the Bonding Hypothesis

Listing of shares in mature equity markets such as those in the US is generally associated with increased disclosure and transparency, bonding hypothesis. An extensive literature explains this as emanating from the relatively higher investor protection and disclosure requirements in the US (Coffee, 1999, 2002, Stulz, 1999, Licht, 2003, and Li, Brockman, and Zuubruegg, 2015). These requirements entail making additional disclosures, resulting in foreign firms becoming more transparent. For example, the listing firm must first file an initial statement of registration with the Securities and Exchange Commission (SEC). It then must file Form-20-F in agreement with the Generally Accepted Accounting Principle (GAAP) or International Financial Reporting Standards (IFRS) reporting standards. Failure to conform to these set requirements may lead to penalties and potential delisting. Also, any documentation provided to investors in the listing firm's local market must be submitted and reviewed by the SEC as part of Form 6-K. Accordingly, US cross-listed firms exhibit increased transparency and reduced information asymmetry compared to their locally listed peers (Domowitz, Glen, and Madhavan 1998 and Lang, Lins, and Miller 2003). Given this fact, the decision to cross-list in the US capital markets signals a firm's commitment to full and higher disclosure requirements. Coffee (1999, 2002) terms this the bonding hypothesis in that firms from countries with weak minority shareholders protection and disclosure requirements may signal their commitment to higher scrutiny and regulation by cross-listing on markets with higher disclosure requirements. As foreign firms become more transparent, factors such as agency cost and information asymmetry tend to reduce[10]. It is also well-established that agency cost and information asymmetry influences corporate dividend policies. While the agency cost theory postulates that dividend payouts leave managers with limited free cash to misuse, the

[10] See Khurana, Martin, and Periera (2007), Lang, Lins, and Miller (2003), Li, Brockman, and Zurbruegg (2015), and Licht (2003)

information asymmetry theory argues that they communicate insider impressions of a firm's prospects. However, these theories, among others, do not entirely explain the dividend policy puzzle.

2.2.2 Corporate Governance and Dividend Payout Policy

Consistent with the agency cost hypothesis of dividend policy, dividends can signal corporate prospects (Bali 2003, Fama, Fisher, Jensen, and Roll, 1969, Pettit, 1972, and Poterba and Summers, 1984). Based on the premise that capital markets are imperfect, there is information asymmetry between managers and other stakeholders. Hence, managers tend to possess information that is usually not publicly available and is mostly not reflected in firm valuation. Managers might use different dividends to communicate their insider knowledge to compensate for the information asymmetry between themselves and the market. This reasoning also supports the signalling theory of dividends, which specifies that the amount of dividend paid at a given period reflects managers' superior insider information about the firm's earnings prospects. Accordingly, higher dividends may signal better earnings prospects, which can result in increased firm value. The signalling theory further asserts that since the market perceives dividends as indicative of managers' insider information, share prices respond accordingly. For instance, an increase in dividends could result in a reactionary rise in share price[11] while steady dividends, could result in stable share prices.

Several studies examine how corporate governance influences dividend policy. For example, Adjaoud and Ben-Amar (2010) consider the link between corporate governance quality and dividend payout policy of Canadian firms using their corporate governance scores. They show that firms with better corporate governance quality pay higher dividends while firm

[11] See for example, Bali (2003)

size and free cash flow levels are essential to dividend policy. Comparing cash dividends of Chinese firms listed in Hong Kong and Mainland China, Zhang (2008) indicates that in both cases, firms that have higher managerial members on the firm's board tend to pay lower dividends. He concludes that better corporate governance requirements compel Hong Kong-listed firms to pay higher dividends. Mitton (2004) samples 365 firms from 19 countries and argues that more robust corporate governance tends to result in higher dividends. He explains that high net income does not fully explain dividends. He also indicates that both firm-level and country-level corporate governance mechanisms complement each other in determining the dividends. Together these studies highlight the relevance of both firm- and country-level corporate governance mechanisms in determining the dividend policy of corporations.

2.2.3 Corporate Governance and Dividend Smoothing

The dividend smoothing discussions are rooted in the study of Lintner (1956), who provided evidence that firms smooth dividend relative to earnings. There is still, however, little agreement on the precise determinants of dividend smoothing. For example, while Kumar (1988) indicates that dividend smoothing increases as firms' cash flow volatility increases, Guttman *et al.* (2010) suggest that firms with higher investment opportunities at shorter horizons tend to smooth dividends compared to other firms. Leary and Michaely (2011) indicate that dividend payout smoothing is more prevalent for younger, more opaque firms, and firms with fewer tangible assets as they stand to benefit from signalling earnings prospects. Bates, Kahle, and Stulz (2009) postulate that firms for which external finance is costly are likely to smooth dividends, even following a spike in earnings. They further indicate that this is mainly true for firms with high precautionary savings motives. Brennan and Thakor (1990) show that firms with more individual investors smooth dividends compared to those with institutional investors.

An alternative explanation for dividend smoothing is the agency-based models. The model argues that dividend smoothing controls the agency cost of free cash flow. For example, Allen *et al.* (2000) show that managers smooth dividends to prevent substantial penalties that institutional investors could impose on them in response to enormous and frequent cuts in dividends. A pioneering study by Easterbrook (1984) specifies that high and smooth dividend reduces the funds available to managers, forcing them to raise funds externally. Thus, exposing managers to the discipline of external financial markets and reducing the agency cost. These studies hinge on the fact that dividends will need to be high and smooth enough to achieve a meaningful reduction in agency costs. Both the information asymmetry and agency cost explanations for dividend smoothing suggest that shareholders and the financial market have different levels of information about the real earnings ability of firms.

The association between corporate disclosure/transparency and dividend smoothing is well-documented in the finance literature. For example, Gugler (2003) examines the relationship between ownership and control structure of firms and their dividend policy. He indicates that state-owned firms smooth payouts while family-owned firms do not. However, he shows that while state-owned organizations smooth dividends, family-owned firms pay minimum dividends. Hamed Al-Yahyaee, Pham, and Walter (2010) study the dividend payout policy of firms from developed and developing economies and show that although firms from developing economies pay smooth dividends, those from developed economies pay smoother dividends. Jeong (2013) investigates the dividend smoothing strategies of Korean firms and finds that while Korean corporations smooth dividends, US firms pay smoother dividends. He further explains that firm characteristics and macroeconomic factors such as interest rates and taxes influence dividend smoothing. An important note is a detail that better corporate governance and disclosure tend to promote dividend smoothing of firms. Given the

improvement in corporate governance and disclosure of US cross-listed firms, it is crucial to understand how such enhancements affect their dividend policies.

2.2.4 Channels of Dividend Payout smoothing

The corporate finance literature shows that managers use other financing decisions to keep dividend payments stable. An extensive literature shows that managers increase (decrease) debt, decrease (increase) investment, or a combination of both to ensure steady dividends (Myers and Majluf, 1984, and Brav *et al.* 2005). Myers and Majluf (1984) provide support for this assertion and show that firms initially engage internal funds and increase external borrowings to keep dividends stable. Aivazian *et al.* (2006) examine corporate payout policies and report the use of both debt and investment channels to steady dividends. They show that firms with access to external funding are more likely to pay stable dividends due to access to external financing. They further show that this is not the case for firms with limited external funding. Campello, Giambona, Graham, and Harvey (2011) use a unique dataset to examine the reaction of firms to severe net income shocks and report that firms increase borrowing during periods of severe net income shocks and sacrifice investments. Campello, Graham, and Harvey (2010) survey 1,050 Chief Finance Officers (CFOs) and find that managers increase borrowings and, at the same time, sacrifice investments when net income is severely impacted, keeping dividends reasonably stable. Lambrecht and Myers (2012) builds on existing literature and propose that for a specific investment strategy, shocks to net income are absorbed using debt to keep payouts smooth. Hoang and Hoxha (2016) empirically test this phenomenon using a variance decomposition approach. They show that investment and debt together absorb about 97% of shocks to net income, while dividends reflect the remaining 3%.

As discussed earlier, the cross-listing literature argues significant increases in the information environment, disclosure and transparency, and analyst coverage after cross-listing. Aggarwal and Kyaw (2009), Krishnamurti, Šević, and Šević (2005), Zhou, Zhou, Peng, Chen, and Li (2018) show that increased transparency reduces both agency conflicts and information asymmetry. They further explain that shareholders, investors, and other stakeholders become increasingly aware of both financial and operational information as firms become more transparent, mitigating any pre-existing agency conflicts or information asymmetry. Given the literature on how agency costs and information asymmetry influence dividend smoothing, we ask the question of whether committing to full disclosure and becoming more transparent through cross-listing affects the dividend smoothing of foreign firms[12].

For cross-listed firms, we expect a change in their dividend smoothing strategies for two reasons. First, volatility in dividends may be considered by the market as earnings volatility and hence might be interpreted as high risk. Second, absorbing shocks by increasing debt may be viewed as financial instability, while sacrificing investment may signal a lack or inadequate prospects.

We contribute to the literature by investigating how commitment to full disclosure and improved transparency through cross-listing impacts dividend smoothing after cross-listing. To this end, we adopt Lintner's partial adjustment model and a variance decomposition approach under an intertemporal budget constraint setup.

[12] See for example Lang, Lin, amd Miller (2003), Licht (2003), Doidge (2004), and Sarkissian and Schill (2016) for further reading

2.3 Data and Summary Statistics

We collect data on firms cross-listed in the US using a consolidation of data from the Bank of New York Mellon, J.P. Morgan, and Citibank depository receipts websites. These depositories provide depository services to all American Depository Receipts (ADRs) and Global Depository Receipts (GDRs) for non-US firms. The data from all the three depository websites identify depository receipts, listing date, home market, and their industry classification, providing a comprehensive dataset for this study. Given that the ADR program is mainly to facilitate US cross-listing, we only consider ADRs. ADRs allow US investors to buy shares of foreign firms while avoiding cross-country transaction fees and currency exchange fluctuations. Following Javakhadze *et al.* (2014), we require firms to have cross-listed for at least five years before 2017 and have pay dividends for at least five consecutive years to be included in our sample. We also require firms to have data on earnings, debt, and investments before and after cross-listing to be considered in the final sample. The resulting data set consists of 20,539 firm-year observations on 893 cross-listed firms from the period 1995 to 2017, guided purely by data availability and meeting all set criteria.

Noting that firm and country characteristics[13] influence dividend payments, we collect data on firm characteristics, including net income, dividend payout per share, market to book value, age, and the number of outstanding shares from the DataStream database. We also collect corporate governance indicators, including ownership control, and Gross Domestic Product (GDP) of the home country. We collect the Corruption Perception Index from the Transparency International website as a proxy for the general corporate governance framework and investor protection for each cross-listing firm's home country[14]. We source Country-level GDP from the World Bank's WDI database.

[13] See for example Chemmanur, He, Hu, and Liu (2010), Leary and Michaely (2011), and Jeong (2013)
[14] Data on the Corruption Perception and methodologies can be sourced from https://www.transparency.org/research/cpi/overview

Table A.1 (in Appendix) shows the sample distribution, indicating the home country and the number of firms in the total sample employed in this study. We observe that the majority of our sample are from Japan and the UK, which are more developed markets and could potentially suggest higher cross-listing demand in developed markets. While this might be the case, it also indicates the existence of peculiar market benefits in the US that might not be available in other developed markets.

Table A.2 (in Appendix) presents summary statistics for all variables. *Net Income* represents the net income scaled by the total number of outstanding shares, *MB* is the market to book value per share, *Payout* is total payout (cash dividends and share repurchase) per share. *Size* is the log of total assets per share. *Age* is the number of years a firm has been cross-listed. *Ownership* is a dummy for whether a firm has a few shareholders (less than 5%) owning majority shares (more than 50%) or not and proxies shareholders' control. *GDP* is the natural logarithm of the home country's Gross Domestic Product (GDP) and proxies market development. *CPI* is the Corruption Perception Index that represents the institutional quality and country-level corporate governance in the home country. The Corruption Perception Index (CPI) is a widely cited data source hosted and published annually by Transparency International. Individual countries are scored from 0 to 10[15], with the highest score indicating the lowest corruption levels. *Debt* represents total debt (short and long-term debts) scaled by the total number of outstanding shares, and *Investment* is the yearly dollar amount of cash balance scaled by the total outstanding shares. Note that we only introduce *Debt* and *Investment* in our variance decomposition analysis.

[15] The CPI scores for countries were scored between 0 and 10 till the year 2012. From 2012, countries are scored between 0 and 100. We divide the given CPI scores from 2012 by ten to avoid measurement disparity and ensure comparability with previous years.

From the summary statistics in *Table A.2*, we observe a relatively similar mean for *Size* and *Net Income*, which may suggest that larger firms tend to have higher net income. *Age* has a mean of 21.96, which indicates that most of our sample firms have been cross-listed for at least 21.96 years on average. Average, minimum, and maximum values for *Net Income* and *Payout* suggest substantial variation in earnings ability and dividend payouts of sample firms. A 5.22 average *CPI* and a standard deviation of 2.34 further indicates that the sample firms are from countries with reasonably good corporate governance mechanisms. However, a minimum of 0.40 also suggests the inclusion of firms from countries with inferior corporate governance mechanisms. *GDP* values indicate a similar narrative to those from *CPI* summary statistics. Thus, wealthy economies tend to have better institutions and governance mechanisms.

2.4 Methodology

2.4.1 Baseline Model

We begin our analysis by estimating a dividend smoothing measure adopting Lintner's partial adjustment payout model. Lintner (1956) shows that managers smooth dividends, making periodic modifications to dividends. A widely accepted measure[16] of dividend smoothing is the Speed of Adjustment (SOA) coefficient, estimated using the equation:

$$\Delta D_{i,t} = \alpha + \beta_1 D_{i,t-1} + \beta_2 E_{i,t} + e_{i,t} \qquad (1)$$

where $\Delta D_{i,t}$ is the change in dividends of firm i in year t. $D_{i,t-1}$ is the dividend payout in the previous year while $E_{i,t}$ is the earnings of firm i in year t. Speed of Adjustment (SOA) is estimated as β_1 from equation (1). SOA measures the change in dividend payout in response

[16] Popularised by Fama and Babiak (1968) and Brav *et al.* (2005)

to a change in earnings. Following Javakhadze *et al.* (2014), earnings are the earnings in year t scaled by the total number of outstanding shares.

From equation *(1)* we compute the speed of adjustment (SOA), β_1, for each firm for the overall period and after cross-listing as part of the initial examination. Dividend smoothing is inversely related to SOA and is expressed as $-\beta_1$. Thus, increased OA reflects a decrease in dividend smoothing, while decreased SOA indicates increased dividend smoothing.

2.4.2 Change in dividend smoothing after cross-listing

Table 2.1 shows that SOA decreases by 9% after cross-listing, indicating that dividend smoothing increases by about 9% after cross-listing. We test the significance of the change in mean using the T-test and Wilcoxon/Mann-Whitney tests of equality, which reports a statistically significant difference in SOA at a 1% significance level. The change in SOA suggests that while firms might engage in dividend smoothing before cross-listing, they are motivated to keep dividends smoother after cross-listing. Whereas we are unable to measure dividend smoothing practices before cross-listing due to data limitation, we report intensified dividend smoothing after cross-listing.

Table 2. 1: SOA: Overall Period and the Period After Cross-Listing (Entire Sample)

Periods	Mean SOA
Overall	45.97% (0.49)
After Cross-listing	36.50 % (0.33)
ΔSOA	9.47%*** (0.16)

Notes: *Table 2.1* shows the mean Speed of Adjustment (SOA) for the overall period and the period after cross-listing. It also reports the change in mean SOA for the overall-period and the after cross-listing-period. Mean SOA values are reported in percentages. Standard Deviation values are presented in parenthesis. *** indicates significance at 1% level.

Given the well-established difference in dividend policy based on home market characteristics, we test how firms from developed and developing markets react to improved transparency. We resort to the country's level of economic development[17] classification by the United Nations (UNCTAD, 2018). The UNCTAD classifies countries into three development categories (developed, transitional, and developing). For simplicity, we combine transitional and developing, resulting in two broad categories, developed and developing. We estimate the mean SOA for firms from developed and developing markets and report the results in *Table 2.2.* We observe increased dividend smoothing for firms from developed and developing economies. However, firms from developed economies pursue smoother dividends compared to those from developing markets. The finding could be explained by investor sophistication and market reaction in the home market. As posited by Silva and Chávez (2008), among other studies, investors in developing markets are more sensitive to dividend related news due to limited liquidity and higher transaction costs. For developed markets, investors are likely to seek capital gains due to higher liquidity and reasonably lower transaction costs.

[17] See for example, Mitton (2004), Zhang (2008), and Javakhadze *et al.* (2014) who show that country level corporate governance mechanisms have significant impact of dividend payout policies of firms.

Table 2. 2: Difference between Developed and Developing Economies' change in Speed of Adjustment (SOA) After Cross-Listing

	Mean SOA		
Periods	**Overall**	**After Cross-listing**	ΔSOA
Developed Countries	41.65% (0.47)	31.38% (0.29)	-10.27%*** (0.18)
Developing Countries	54.26% (0.52)	46.33% (0.38)	-7.93%*** (0.14)

Notes: *Table 2.2* shows the mean Speed of Adjustment (SOA) for the overall period and the period after cross-listing. It also the change in mean SOA for the overall period and the period after cross-listing for firms from developed and developing economies. Mean SOA values are reported in percentages, while ΔSOA presents the change in SOA after cross-listing. Standard Deviation values are presented in parenthesis. *** indicates significance at 1% level.

Previous studies report that firms from different industries have different cash flow needs. While some industries are cash flow dependent and require external financing, others have minimum cash flow needs and can raise funds internally. A firm's dependence on internal or external sources of funding might be important to its subsequent dividend policy. Again, the level of industry competition can influence dividend smoothing behavior. For example, Javakhadze *et al.* (2014) indicate that firms from very competitive industries are motivated to keep dividends stable to attract investment capital. Also, firms from mature and high-profit industries might increase investments to smooth dividends, while those from cash-intensive industries might increase borrowing to keep dividends stable (Miao, 2005, and Kayo and Kimura, 2011). Using the Industry Classification Benchmark (ICB, Rev 4), we categorize our sample into 11 industries in Table 2.3. From Table 2.3, we observe that most industries show an average increase in dividend smoothing of about 8% after cross-listing. However, we also report a reduction in dividend smoothing of firms from the Agriculture, Forestry, and Fishing,

Electricity, Gas, Steam and air conditioning activities, and Administrative and support service activities industries. Together these industries show an average reduction in dividend payout smoothing of about 6% after cross-listing. We posit, similar to Hoang and Hoxha (2016) that the cash requirements, level of competition, industry growth, and ability to raise funds could explain these differences.

Table 2. 3: Differences in Speed of Adjustment (SOA) After Cross-Listing by Sector

Industries	Overall Period	After Cross-Listing	ΔSOA
	27.91%	34.07%	6.16%***
Agriculture, Forestry, and Fishing	(0.34)	(0.11)	(0.23)
	51.98%	39.97%	-12.01%***
Mining and Quarrying	(0.52)	(0.29)	(0.23)
	38.23%	33.35%	-4.89%***
Manufacturing	(0.49)	(0.27)	(0.22)
	27.83%	36.44%	8.61%***
Electricity, Gas, Steam and air conditioning activities	(0.41)	(0.36)	(0.05)
	44.07%	39.11%	-4.96%***
Transportation and Storage	(0.29)	(0.20)	(0.09)
	55.26%	46.47%	-8.79%***
Accommodation and food service activities	(0.49)	(0.33)	(0.16)
	44.51%	42.07%	-2.44%***
Information and Communication	(0.36)	(0.26)	(0.10)
	39.01%	37.62%	-1.36%***
Financial and Insurance Activities	(0.36)	(0.28)	(0.08)
	48.47%	23.55%	-25.47%***
Professional, Scientific and technical activities	(0.32)	(0.07)	(0.25)
	7.24%	13.64%	6.40%***
Administrative and support service activities	(0.53)	(0.36)	(0.17)
Human health and social work activities	35.01%	31.51%	-3.50% ***
	(0.46)	(0.36)	(0.10)

Notes: *Table 2.3* shows the mean Speed of Adjustment (SOA) for the overall period and the period after cross-listing for 11 industries. It also shows the change in SOA for these 11 industries after cross-listing. Mean SOA values are reported in percentages while ΔSOA presents the change in SOA after cross-listing. *** indicates significance at 1% level.

2.4.3 Determinants of payout smoothing (Overall and after cross-listing)

Following the increased pursuit of dividend smoothing after cross-listing, we follow Leary and Michaely (2011) and investigate the factors that explain dividend smoothing after cross-listing.

Correlation results for all variables are reported in *Table A.3* (in the Appendix). We note that total payout is positively correlated with *Size* and *CPI*. *Age* and *Ownership* are negatively correlated with *Payout*, suggesting older firms and firms with low ownership control smooth dividends. We observe a high correlation between firm size and age as older firms tend to have substantial assets. The maximum and minimum correlation coefficients provide evidence of the absence of multicollinearity issues among variables.

We implement a cross-sectional Heteroskedasticity and Autocorrelation Consistent (HAC) regression using the estimated β_1 from *Equation (1)*, which follows the model:

$$SOA_i = \beta_0 + \beta_1 MB + \beta_2 Payout + \beta_3 Ownership + \beta_4 Age + \beta_5 Size + \beta_6 CPI + \beta_7 GDP + \varepsilon_i \quad (2)$$

where SOA_i represents the change in dividends from a shock in earnings. MB is the market to book value per share for each sample firm. $Ownership$ is a dummy variable that takes the value of 1 if a firm has high ownership concentration. Age represents the number of years a firm has been cross-listed in the U.S. $Size$ is the total assets per share of the firm. CPI is the Corruption Perception Index score of the firm, which proxies country-level corporate governance. GDP is the Gross Domestic Product of the home country of the firm. ε_i represents the error term. Detailed variable definitions and sources are provided in *Table A.5* in the Appendix.

From *Equation (2)*, we estimate two regressions for the overall period and the period after cross-listing and report our results in *Table 2.4*. Estimations results reported in columns (1) and (3) do not include country and industry fixed effects. Those reported in columns (2) and (4) control for both country and industry fixed effects. From *Table 2.4*, we observe that dividend payouts and firm age negatively and significantly impact SOA for the overall period with and without the fixed effects. Consistent with the univariate results of Leary and Michaely (2011), these results suggest that higher dividend smoothing is associated with different levels of dividends while controlling for the joint agency, performance, and information asymmetry measures. Although the age of firms is negative and significant during the overall period, it loses its significance after cross-listing. All other independent proxies remain statistically insignificant in both periods.

Table 2. 4 Cross-sectional Estimation of the determinants of SOA

	Overall Period		After Cross-listing	
	(1)	(2)	(3)	(4)
C	0.4006**	0.4768**	0.9140***	0.9793***
	(2.019)	(2.155)	(3.390)	(3.060)
MB	0.0030	0.0038	-0.0248	-0.0239
	(0.847)	(0.865)	(-1.513)	(-1.193)
Payout	-0.0004***	-0.0002***	-0.0002***	-0.0005**
	(-5.380)	(-5.622)	(-6.295)	(-2.199)
Ownership	0.0589	0.0567	0.0344	0.0278
	(1.124)	(1.048)	(0.526)	(0.407)
Age	-0.0071***	-0.0075**	-0.0032	0.0000
	(-2.696)	(-2.550)	(-0.437)	(-0.004)
Size	0.0352	0.0377	-0.0019	-0.0096
	(1.404)	(1.342)	(-0.106)	(-0.441)
CPI	-0.0789	-0.1102	-0.0210	0.0268
	(-1.195)	(-1.416)	(-0.248)	(0.258)
GDP	-0.0145	-0.0101	-0.0487	-0.0785
	(-0.455)	(-0.290)	(-1.003)	(-1.266)
Fixed Effects	No	Yes	No	Yes
Adjusted R-squared	0.021	0.080	0.024	0.081

Notes: *Table 2.4* presents the cross-sectional estimation of the determinants of SOA for the overall sample period and the period after the US cross-listing. The independent variable, SOA, is the measure of dividend smoothing. *, ** and *** indicate statistical significance at 10%, 5%, and 1%, respectively. T-statistic are printed in parenthesis.

2.4.4 Decomposition of Net Income Smoothing Channels

2.4.4.1 The variance decomposition approach

We established that foreign firms pursue stable dividends after cross-listing. In this section, we examine the channels firms employ to achieve steady dividends. From *Equation (1)*, we use the intertemporal budget constraint developed by Lambrecht and Myers (2012) to test the response of dividends to net income shocks after cross-listing. Hoang and Hoxha (2016) forward two essential arguments in this respect. They argue that adverse shocks to net income may be absorbed using debt channels. However, positive net income shocks may be reflected in increased investments. Thus, shocks to net income may be absorbed by either or a blend of debt or investment channels. We, therefore, employ a foundational model for a firm's smoothing strategy considering its inter-temporal budget constraint in line with Lintner's model of dividend smoothing, further improved by Lambrecht and Myers (2012) in the form:

$$\Delta Debt_i + Net\ Income_i = \ Investment_i + Payout_i \qquad (3)$$

The model specifies that firms absorb the shocks in $Net\ Income_i$ by altering $Debt_i$ through the settlement of current debt, increasing borrowings, and altering $Investment_i$ (cash balances)[18]. Lintner's partial adjustment model suggests that managers set and follow a target dividend subject to the availability of investments and net income, aimed at minimizing frequent changes in dividend payments.

Lintner developed his model based on an examination of a sample of big American firms, with dividend payments consisting of cash dividends solely. Lambrecht and Myers (2012) advanced this approach (as stipulated in Equation 2) with some reforms that included a comprehensive theory of payout, debt, and investment, following the intertemporal budget

[18] All of which are restricted by SCR.

limitation and the dynamics of dividend smoothing[19]. For example, the payouts adopted in Lambrecht and Myers's approach covered cash dividends as well as stock repurchases. The use of these two forms indicates total payout.

Equation (3) indicates that when $Net\ Income_i$ fluctuates, and firms want to maintain minimum variation to dividends, the intertemporal budget restrictions might be brought back to balance by altering net debt ($\Delta Debt_i$), and/or by altering $Investment_i$. For example, Hoang and Hoxha (2016) postulate that firms may increase their investment in response to shocks to net income that offer opportunities for growth and expansion. Else, firms may alter their debt ratio to absorb net income shocks, while keeping investment unchanged. Given this background, this study follows Lintner (1956), Brav *et al.* (2005), Lambrecht and Myers (2012), and assume that firms may want to keep payouts steady after cross-listing.

Our model examines how the commitment to full disclosure and improved transparency from cross-listing in the US influence the dividend smoothing strategies of firms. We follow the variance decomposition model developed by Asdrubali, Sørensen, and Yosha (1996), and Sørensen and Yosha (1998) to examine this relationship. This methodology is used mainly in the economics literature to measure income and consumption smoothing channels. For example, Balli and Balli (2011) investigate the likely welfare gains and channels of income smoothing. They adopt the variance decomposition approach to measure the degree of risk-sharing and their channels thereof. Balli, Kalemli-Ozcan, and Sørensen (2012) also adopt this approach while studying risk-sharing through capital gains.

[19] More detailed explanations are provided in Lambrecht and Myers (2012)

This study follows Hoang and Hoxha (2016) while implementing the approach of Asdrubali *et al.* (1996), and Sørensen and Yosha (1998), and propose the ensuing expression to detect the corporate intertemporal budget restriction:

$$Net\ Income_i = \frac{Net\ Income_i}{Net\ Income_i + \Delta Debt_i} \times \frac{Net\ Income_i + \Delta Debt_i}{Payout_i} \times Payout_i \qquad (4)$$

We conjecture that firms are likely to smooth changes in earnings through borrowings, which should be evident in the variation between $Net\ Income_i$ and $Net\ Income_i + \Delta Debt_i$. Another smoothing channel can be through a firm's investment, evident in the difference between $Net\ Income_i + \Delta Debt_i$ and $Payout_i$ (from *Equation 3*) when volatility in a firm's earnings is not entirely smoothed using debt.

By adopting the approach of Hoang and Hoxha (2016), we can ascertain the magnitude of changes in $Net\ Income_i$ absorbed by firms using debt and investment channels. To achieve that, we apply a log transform and first difference to the factors in *Equation (4)* to provide a growth rate expression. We follow that by also multiplying both sides of the equation with $\Delta logNet\ Income_i$ to generate the cross-sectional variance decomposition equation expressed as:

$$Net\ Income_i{:}var\{\Delta logNet\ Income_i\} = cov\{\Delta logNet\ Income_i, \Delta logNet\ Income_i - \Delta log(Net\ Income_i + \Delta Debt_i)\} + cov\{\Delta logNet\ Income_i, (\Delta log(Net\ Income_i + \Delta Debt_i) - \Delta logPayout_i)\} + cov\{\Delta logNet\ Income_i, \Delta logPayout_i\} \qquad (5)$$

We further scale both sides of *Equation (5)* with the variance of $\Delta logNet\ Income_i$ that results in attaining the slope coefficients from three different panel univariate regressions with a total sum of 1. Thus, expressed mathematically as:

$$1 = \beta_D + \beta_I + \beta_P \tag{6}$$

where β_D represents the slope coefficient in the regression of $\Delta logNet\ Income_i - \Delta log(Net\ Income_i + \Delta Debt_i)$ on $\Delta logNet\ Income_i$ and proxy the debt channel; β_I represents the slope coefficient in the regression of $\Delta log(Net\ Income_i + \Delta Debt_i) - \Delta logPayout_i$ on $\Delta logNet\ Income_i$ and also a proxy for the investment channel. β_P represent the slope coefficient, in the regression of $\Delta logPayout_i$ on $\Delta logNet\ Income_i$ and proxy the payout channel of smoothing of earnings.

Using the following panel regressions, we produce the estimation coefficients for *Equation (7)* as:

$$\Delta logNet\ Income_{it} - \Delta log(Net\ Income_{it} + \Delta Debt_{it}) = \beta_D \Delta logNet\ Income_{it} + \epsilon_{itD} \tag{7a}$$

$$\Delta log(Net\ Income_{it} + \Delta Debt_{it}) - \Delta logPayout_{it} = \beta_I \Delta logNet\ Income_{it} + \epsilon_{itI} \tag{7b}$$

$$\Delta \log Payout_{it} = \beta_P \Delta \log Net\ Income_{it} + \epsilon_{itP} \tag{7c}$$

where i is the firm characteristics at time t while t is the year of observation for the three-panel regressions given above. With this, we can interpret an assumed 100% increase in the growth rate of $Net\ Income_{it}$ as the given variables in the equations above.

Equation (7a) argues that if firms smooth variations by returning debt, the growth rate of $\Delta Debt_{it}$ is 100%, which further shows the term $Net\ Income_{it} + \Delta Debt_{it}$ grows at a rate of zero. A coefficient, $\beta_D = 1$ is generated from the regression of $\Delta log Net\ Income_{it} - \Delta log(Net\ Income_{it} + \Delta Debt_{it})$ on $\Delta log Net\ Income_{it}$ if changes in net income are entirely compensated for by debt repayment. If a 100% increase in $Net\ Income_{it}$ increases by 100% result in no smoothing in borrowing, $Net\ Income_{it} + \Delta Debt_{it}$ is adjusted to grow at a rate same as that of $Net\ Income_{it}$. Thus, regressing $\Delta log Net\ Income_{it} - \Delta log(Net\ Income_{it} + \Delta Debt_{it})$ on $\Delta log Net\ Income_{it}$ results in β_D being equal to zero. On the other hand, if changes in net income are not entirely compensated for with debt totally, we expect that these changes are compensated for by adjusting investments. These adjustments to investments are justified by the same reasons given for alterations in debt/borrowing. From *Equation (7b)*, the dependent variable, $\Delta log(Net\ Income_{it} + \Delta Debt_{it}) - \Delta log Payout_{it}$, represent investments with a coefficient, β_I, proxying the magnitude of changes to earnings that are absorbed by adjusting investments.

From *Equation (7c)*, the coefficient β_P represents the percentage of change in earnings that are not compensated for by adjusting debt and investment channels. From a theoretical perspective, dividends should remain smooth as changes in net income are compensated for with adjustments to debt and investments. Thus, dividend payouts are regarded as smoothed when β_P approaches zero. A case of a perfect dividend smoothing would imply that β_P is zero (i.e., β_P = 0). Given that investment and debt financing both smooth shocks to net income, the unabsorbed shock is reflected in the coefficient of β_P. Although the literature on the subject is limited, Hoang and Hoxha (2016) show evidence that firms use debt and investment to smooth shocks in net income, ensuring little to no variability in dividends. In the case of cross-listed firms, it becomes more financially stressful to maintain this approach in both the home and host markets. We test this phenomenon running *Equations (7a) -(7c)* on a panel data estimation

with results presented in *Table 2.5*. In an ideal case, all betas should add up to exactly 100% or 1. However, our sample suffers from heteroskedasticity and autocorrelation, which results in cross-sectional estimation betas that do not add up to exactly 100% or 1. This does not affect the substance of our analysis.

2.4.4.2 Benchmark Results

To examine whether cross-listed firms use debt and investment to keep dividends smooth, we employ firm-level data. *Table 2.5* presents the benchmark results for the overall period, pre-cross-listing, and post-cross-listing periods. The unsmoothed coefficient (β_P) for the overall period yields 12% and statistically significant. More importantly, we show substantial differences in dividend smoothing before and after the cross-listing. Specifically, we observe that the unsmoothed shocks to net income reduce from 14% to 6% after cross-list in the US. In line with our initial findings, the negative trend in β_P suggests that firms seek to appear financially stable by providing a dividend policy less dependent on net income fluctuations.

To achieve this aim, cross-listed firms use different channels to absorb net income shocks. *Rows (1)* and *(2)* of *Table 2.5* show the magnitude of income shocks absorbed using debt and investment. We find that before cross-listing, 62% of fluctuations in earnings are absorbed through debt, while 25% are absorbed through investment. Our results add to the discussions that debt and investments are the primary channels in smoothing fluctuations in earnings. These figures are not very far away from those from Hoang and Hoxha's, where they find that debt and investment absorb 56.85% and 40.72% of the shocks to net income (Hoang and Hoxha, 2016). However, consistent with our findings, we show a positive change in estimated coefficients. We report that net income smoothing via debt increases from 62% to 66%, while that for investment increases from 25% to 31% after cross-listing.

We, therefore, argue that firms adjust their dividend payouts and provide reasonably smoother dividends after cross-listing. We also show that firms achieve this by increasing (decreasing) debts and decreasing (increasing) investment channels to absorb fluctuations in net income. We again postulate that positive shocks to net income are smoothed by increasing investments, while negative shocks are smooth by decreasing the amount of investments. This is evident in the increase in investment channels (from 25% to 31%) after cross-listing. Thus, one might argue that after cross-listing, firms absorb more shocks to net income using the investment channels compared to debt channels, given the 6% increase in investment channels compared to the 4% increase in debt channels. These adjustments to debt and investment channels are further shown in the amount of unabsorbed shocks to net income (β_P), where the unabsorbed shock to net income decreases by 8% (from 14% to 6%) after cross-listing. The decrease suggests, in line with our initial results, that cross-listed firms smooth dividends after cross-listing. Stable dividends are achieved by adjusting either or both debt or investment channels.

Table 2. 5: The decomposition of the Net Income Smoothing via Different Channels (Entire Sample).

	Full Period	Before Cross-Listing	After Cross-Listing
Debt (β_D)	64%***	62%***	66%***
	(0.02)	(0.03)	(0.03)
Investment (β_I)	27%***	25%***	31%***
	(0.03)	(0.02)	(0.02)
Payout (β_P)	12%***	14%***	6%***
	(0.01)	(0.01)	(0.01)

Notes: The table shows shocks to net income absorbed by alterations to debts and investments. Payout (β_P) represents the magnitude of the shock to net income unabsorbed. β_D is the slope coefficient from Equation (7a), $\beta_I$is the slope coefficient from Equation (7b). β_P is the slope coefficient from Equation (7c). The coefficients are multiplied by 100. ***, **, and * show a 1%, 5%, and 10% levels of significance, respectively, while values in parenthesis are standard errors.

2.4.4.1 Channels of smoothing for firms from developed and developing markets

Similar to the results in *Table 2.2*, several studies show different dividend smoothing magnitudes across different markets (e.g., Jeong 2013). Consequently, shocks to net income may be smoothed with more debts or investment, depending on the home market's development. This section explores how dividend smoothing differs conditional on the home market's development. We differentiate developed and developing markets using the home market's development based on the United Nation's classification (UNCTAD, 2018). The UNCTAD classifies countries into three development categories (developed, transitional, and

developing). For simplicity, we combine transitional and developing, resulting in two broad categories (developed and developing). From *Table 2.6* and *2.7*, we find that before cross-listing, firms from developed countries smooth 62% of shocks to income using debt while those from developing countries smooth 86% of net income shocks using debt. We also find that after cross-listing, firms from developed economies intensify the use of debt channels from 62% to 73%. Firms from developing economies absorb less (from 86% to 74%) shocks to net income using debt channels. A potential explanation could be the pre-existing high use of debt to smooth net income shocks before cross-listing. This finding is also in line with the positive association between developing capital markets, weak corporate governance mechanisms, and high debt ratios in emerging markets (Aivazian, Booth, and Cleary, 2001, and Mitton, 2008). Aivazian *et al.* (2001) indicate that the lack of transparency and weak shareholder protection in emerging markets promote the signaling role of dividends. Consequently, firms from emerging countries are motivated to increase debt to signal prospects. After cross-listing, firms become more transparent, reducing debt accumulation, whether it is a good or bad year. After cross-listing, these firms tend to use more investments to smooth net income shocks to be regarded as financially stable by investors.

On the investment front, we observe a reduction in the use of investment channels (from 30% to 22%) for firms from developed markets while we observe an increase (from 0% to 21%) for firms from developing countries. More importantly, we find that while firms from developed countries make a 5% adjustment to dividend payouts after cross-listing, those from developing markets make a 7% change. Thus, our results suggest that firms from emerging countries tend to use investments channel- increase investment in good years, decrease investment in bad years to smooth net income shocks, instead of debt channel

Coefficients of the unabsorbed shocks to net income (β_P) show a more drastic reduction (from 16% to 7%) for firms from emerging economies after cross-listing. Firms from developed economies show a less drastic decrease (from 9% to 5%) in the amount of unabsorbed shock to net income compared to firms from developed markets. However, after cross-listing, firms from developed economies appear to have a lower (5%) unabsorbed shock to net income compared to the 7% for firms from emerging economies. It is apparent that cross-listing in the U.S motivates dividend smoothing, as shown in the decrease in the amount of unabsorbed shocks to net income for both firms from developed and emerging economies.

Table 2. 6: The decomposition of the Net Income Smoothing via Different Channels (Developed and Developing Countries)

	Full Period Period	Before Cross-Listing	After Cross-Listing
Panel A: Developed Countries			
Debt (β_D)	65%***	62%***	73%***
	(0.02)	(0.03)	(0.03)
Investment (β_I)	30%***	30%***	22%***
	(0.03)	(0.06)	(0.02)
Payout (β_P)	7%***	9%***	5%***
	(0.01)	(0.01)	(0.01)
Panel B: Developing Countries			
Debt (β_D)	73%***	86%***	74%***
	(0.02)	(0.05)	(0.03)
Investment (β_I)	14%***	0%***	21%***
	(0.03)	(0.03)	(0.02)
Payout (β_P)	14%***	16%***	7%***
	(0.01)	(0.03)	(0.01)

Notes: The table shows the shocks to net income absorbed by alterations to debts and investments. Payout (β_P) represents the magnitude of the shock to net income unabsorbed. β_D is the slope coefficient from Equation (7a), $\beta_I$is the slope coefficient from Equation (7b). β_P is the slope coefficient from Equation (7c). The coefficients are multiplied by 100. ***, **, and * show a 1%, 5%, and 10% levels of significance, respectively, while values in parenthesis are standard errors.

2.5 Conclusion

Dividends are generally considered a vital outlet to signal earnings expectations. Therefore, managers smooth dividend payouts via financing decisions, including debt and investment decisions. Several studies argue that information asymmetry determines dividend smoothing. Consistent with the bonding hypothesis, cross-listing signals a firm's commitment to full disclosure and transparency: decreasing information asymmetry and agency cost. This paper examines how and to what extent commitment to full disclosure and transparency through cross-listing impacts the dividend smoothing strategies of firms and ascertain the channels of achieving stable dividends.

The initial results are based on Lintner's partial adjustment dividend model, where the speed of adjustment (SOA) is inversely related to dividend smoothing. Our findings show a 9.47% increase in dividend smoothing after cross-listing. We report a higher increase in dividend smoothing for firms from developed economies at 10.27% compared to those from developing economies at 7.93%. Given the well-evidenced variation in cash requirements across different industries, we examine the dividend smoothing across various industries. We find that all other firms exhibit increased dividend smoothing after cross-listing except those from Agriculture, Forestry and Fishing, Electricity and Gas, Administrative, and Support Service activities industries.

Novel to the cross-listing literature, we decompose the net income smoothing channels in line with Lambrecht and Myers (2012). Our results show an increase in the use of both debt and investment channels to smooth shocks to net income. We also examine the difference in the net income smoothing by the home country's development status. We show that while firms from developing economies tend to sacrifice more investments to smooth net income shocks, firms from developed countries use more debts after cross-listing.

Overall, our results highlight that commitment to full disclosure and improved transparency further exposes firms to market forces. Such exposure motivates managers to keep dividends stable due to the information content of dividend payment. The findings in this paper also highlight the interaction between corporate financing decisions and dividend smoothing strategies.

Appendix

Table A. 1: Sample Distribution

Country	Number of Firms	Percentage of Sample
Argentina	8	0.90%
Australia	45	5.04%
Austria	11	1.23%
Belgium	11	1.23%
Brazil	21	2.35%
Chile	6	0.67%
China	14	1.57%
Colombia	1	0.11%
Czech Republic	1	0.11%
Denmark	9	1.01%
Egypt	1	0.11%
Finland	16	1.79%
France	33	3.70%
Germany	41	4.59%
Greece	6	0.67%
Hong Kong	55	6.16%
Hungary	2	0.22%
India	28	3.14%
Indonesia	16	1.79%
Ireland	10	1.12%
Israel	2	0.22%
Italy	25	2.80%
Japan	191	21.39%
Korea	10	1.12%
Lithuania	1	0.11%
Luxembourg	1	0.11%
Macau	1	0.11%
Malaysia	7	0.78%
Mexico	13	1.46%
Morocco	1	0.11%
Netherlands	15	1.68%
New Zealand	8	0.90%
Norway	9	1.01%
Peru	1	0.11%
Philippines	14	1.57%
Poland	3	0.34%
Portugal	6	0.67%
Romania	1	0.11%
Russia	5	0.56%
S. Africa	20	2.24%
Singapore	25	2.80%
Spain	15	1.68%

Sri Lanka	1	0.11%
Sweden	18	2.02%
Switzerland	19	2.13%
Taiwan	18	2.02%
Thailand	22	2.46%
Turkey	14	1.57%
UK	90	10.08%
Venezuela	2	0.22%
Total	893	100%

Notes: *Table A.1* shows each sample country, the number of firms, and the percentage in the sample.

Table A. 2: Summary Statistics

	Mean	**Median**	**Max.**	**Min**	**S.D**	**Skew.**	**Kurt.**
Net Income	14.08	13.96	23.82	0.13	2.69	0.22	3.10
MB	3.06	0.65	20.27	-4.60	5.72	1.43	3.56
Payout	0.61	0.34	16.00	0.01	12.47	1.50	3.45
Size	13.41	14.70	21.82	4.60	5.14	-2.10	6.95
Age	21.96	26.00	32.00	4.00	7.82	-0.80	2.46
Ownership	0.67	1.00	1.00	0.00	0.46	-0.73	1.54
GDP	3.56	3.56	4.84	2.42	0.56	0.01	2.35
CPI	5.22	4.80	10.00	0.40	2.34	0.31	1.79
Debt	12.28	12.54	19.53	0.06	2.58	-0.68	4.22
Investment	0.12	0.06	1.99	0.00	1.65	0.22	7.64

Notes: *Table A.2* presents the summary statistics for all variables. Firm characteristics include *Net Income, MB, Payout, Size, Age, Ownership, Debt,* and *Investm*. Country-level characteristics employed in this analysis include *CPI* and *GDP*. S.D = Standard Deviation, Skew. = Skewness, and Kurt. = Kurtosis

Table A. 3: Pairwise Correlation between Main Variables

Correlation	1	2	3	4	5	6	7	8	9	10
1. Net Income	1.00									
2. MB	0.18	1.00								
3. Payout	-0.14	-0.03	1.00							
4. Size	0.09	-0.31	0.02	1.00						
5. Age	0.02	-0.05	-0.02	0.15	1.00					
6. Ownership	-0.03	-0.01	-0.01	-0.03	0.01	1.00				
7. GDP	-0.12	-0.22	-0.01	-0.22	-0.01	0.02	1.00			
8. CPI	0.03	-0.05	0.01	-0.22	-0.04	0.03	0.34	1.00		
9. Debt	0.01	-0.01	0.00	0.00	0.02	-0.03	-0.01	-0.07	1.00	
10. Investment	0.02	0.00	0.04	-0.04	0.04	0.01	0.02	0.01	0.10	1.00

Notes: *Table A.3* presents the pairwise correlation coefficients for all variables employed in the multivariate analysis. Firm-level characteristics include *Net Income, MB, Payout, Size, Age, Ownership, Debt,* and *Investm*. Country-level features used in this analysis include *CPI* and *GDP.*

Table A. 4: Variable definition and source

Variable	Definition	Source
SOA_i	Represents the speed of adjustment (SOA)	Manually estimated by the author using Lintner's partial adjustment model
MB	Measures the market to book value per share for each sample firm	Datastream
$Ownership$	Measure ownership control and is a dummy for whether few shareholders (less than 5%) own majority shares (more than 50%). It proxies shareholders' control	Datastream
Age	Represents the number of years a firm has been cross-listed in the U.S.	Consolidation of Data from the Bank of New York Mellon, J.P. Morgan, and Citibank depository receipts websites
$Size$	Measures the total assets per share of the firm	Datastream
CPI	Represents the Corruption Perception Index score of the home country of each firm, which proxies country-level corporate governance	Transparency International website: https://www.transparency.org/research/cpi/overview
GDP	Measures the Gross Domestic Product of the home country of the firm	World Bank's WDI database
$Debt$	Measures total debt and is the sum of short- and long-term debts per share	Datastream
$Investment$	Measures the cash balances per share	Datastream

Notes: *Table A.5* presents the definition of all variables employed in the study and their source.

CHAPTER THREE

Cross-listing Decisions and Specialization in Output

This study investigates how specialization in the output of the local and the host market impacts the cross-listing decisions of firms. Implementing a gravity model on a sample of 1779 firms, we find that market specialization is an essential consideration in the decision to cross-list and the choice of the host markets. Results from a firm and industry-level examination show that firms from local markets that specialize in specific industries engage in more cross-listing. We document that firms from such specialized local markets prefer to cross-list in less specialized host markets. We also report, especially at the firm-level, that firms seek funding diversification opportunities in the choice of the host market.

3.1 Introduction

A prominent outcome of globalization and economic integration is specialization in national output. Accordingly, countries have progressively become more specialized in specific industries (Bikker and Haaf, 2002, and Aiginger and Davies, 2004). Firms operating in such local markets tend to face higher competition in all areas, especially in funding due to the sheer number of firms competing for similar funds (Van Rijckeghem and Weder, 2001, Wahal and Wang, 2011). Cross-listing shares on foreign markets may provide firms from such markets the ability to raise foreign capital (Korczak and Korczak 2013). Unlike other generic sources of funding, cross-listing offers additional market outcomes. These outcomes include increased analyst coverage (Baker, Nofsinger, and Weaver, 2002), improved information environment (Bris, Cantale, Hrnjić, and Nishiotis, 2012), improved liquidity (Bacidore and Sofianos 2002; Berkman and Nguyen 2010) better corporate governance (King and Segal 2003, Karolyi 2012, and Li, Brockman, and Zurbruegg, 2015) and

increased foreign sales (Pagano, Röell, and Zechner, 2002, and Dodd 2013)[20]. The current study examines whether specialization in the output of the local and host markets influences the cross-listing decision and the choice of the host market.

An extensive literature investigates the determinants of cross-listing decisions and the choice of the host market. The evidence suggests that market characteristics in both the local and host markets interact with firm-level characteristics to motivate the cross-listing decision and the choice of the host market. However, there is limited consensus on the direction of the impact of market characteristics. The literature proposes two main arguments. The first argument suggests that the decision to cross-list and the choice of the host market is motivated by poorly functioning local markets, with inadequate minority shareholder protection and inefficient regulatory systems (e.g., Karolyi, 2004, Korczak and Korczak, 2013). This argument builds on the premise that cross-listing provides a means of listing on host markets with more robust markets. These studies highlight suggest the relevance of market characteristics in the cross-listing decision and provide evidence that firms might be seeking positive market outcomes associated with more robust markets.

The second argument suggests that firms from higher-income economies with better macro policies, efficient legal systems, and more robust markets engage in more cross-listing compared to developing economies. This proposition is argued from an investor perspective. It shows that investors in the host market are likely to patronize firms from markets with sound fundamentals (e.g., Claessens, Klingebiel, and Schmukler, 2006). This line of argument suggests that firms from markets with sound fundamentals seek cross-listing in response to investor demands. While these two strands of arguments focus on market development and may not provide consensual results on how market fundamentals drive cross-listing decisions, they point to the relevance of market characteristics in the decision to cross-list and the choice of the host market.

[20] Abdallah and Ioannidis (2010), Li et al. (2015), and Sarkissian and Schill (2016) report that these incentives are among the significant reasons firms seek a foreign listing.

In addition to market development, the literature shows that proximity (Ahearne, Griever, and Warnock, 2004, Chan, Covrig, and Ng, 2005, and Dodd and Frijns, 2015) and firm and industry-specific characteristics (Lang, Lin, and Miller, 2003b, Doidge, Karolyi, and Stulz, 2004, Abdallah and Ioannidis 2010) influence cross-listing decisions and the choice of the host market. However, two opposing pieces of evidence are presented. The first evidence shows that firms cross-list on markets that are geographically closer to their local market and have similar industrial setup as those in their local market. The other evidence suggests that firms seek cross-listing in markets that are further from the local market geographically and with a different industrial setup. Given this background, it becomes essential to understand how these dynamics interact with the specialization in the output of the local and host markets to determine the cross-listing decision and the choice of the host market.

This paper proposes the following arguments. One, specialization in output suggests competition among firms that operate in that industry in all spheres, in particular competition for funds (Van Rijckeghem and Weder, 2001, Wahal and Wang, 2011). Such competition is likely to drive firms to seek other sources of funding through listing on foreign markets (e.g., Mayer and Ottaviano, 2008, and Aiginger and Davies, 2004). Two, we propose that firms may seek cross-listing in countries that are specialized in a given industry. This proposition follows the assertion of Pagano *et al.* (2002). They assert that firms are likely to cross-list in markets with similar positive market outcomes as their competitors to gain the same competitive edge. These two propositions suggest that firms may seek cross-listing in an attempt to compete less for funding or in an effort to gain additional benefits in a specialized foreign market. To our knowledge, no study has examined how specialization in output influences the cross-listing decision and the choice of the host market. This study fills this gap and provides insight into how local and host market characteristics interact with firm attributes to influence the cross-listing and the choice of the host market.

We collect data on cross-listing decisions for the period 1995 to 2014, guided by data availability. We adopt a gravity model setup, which enables us to control for bilateral linkages between the local and host markets. The dependent variable, the share of cross-listing, is expressed as a ratio of cross-listings from a given local market listed in each host market according to their respective industries. We initially undertake a firm-level analysis and then aggregate the data to perform an industry-level analysis to ascertain any industry-level trends. The industry-level analysis is motivated by the well-established phenomenon that certain industries are commonly attracted to specific markets (Bancel, Kalimipalli, and Mittoo, 2004).

Results from the firm-level analysis show that specialization in the output of the local market encourages cross-listing. This finding suggests that the cross-listing decision is motivated by a firm's desire to seek diversification in funding sources and the unwillingness of managers to compete in the local market for funding. The results are also supportive of the literature that competition in the local market drives firms to seek new markets. We find a preference for host markets that are less specialized and further away from the local market. Our findings suggest the weakening of the proximity bias, which were previously valid in explaining bilateral asset flows (Frenkel, Funke, and Stadtmann, 2004, Aviat and Coeurdacier, 2007, and Lane and Milesi-Ferretti, 2008). Next, we examine this relationship at the industry level and find that specialization in output in the local market foster cross-listing. Again, we report a preference for host markets that are less specialized and further away from the local market, further indicating the weakening of the proximity bias.

We then implement a Generalized Method of Moment (GMM) approach to assess the robustness of the results and report similar results as those from the initial analysis. The findings provide new evidence for the weakening of the gravity model conditions in line with recent studies. The results also suggest that while specialization in output may be a country-specific characteristic, cross-listing might present a spillover channel to alter specialization in output. Again, the findings offer new evidence on the relevance of market characteristics in the cross-listing decision.

The rest of this study proceeds as follows. The related literature is presented in section 2, while Section 3 presents data and descriptive statistics. Section 4 provides details of the methodology. Section 5 of the study discusses the estimation results from the analysis. The Conclusion and implications follow in Section 6.

3.2 Related Literature

In the face of globalization, international trade and asset flows have become fluent in recent years. Pioneering studies on international trade, asset flows, and output specialization, including Porter (1990), show that the removal of international trade and asset flow barriers exposed countries to higher competition in their production output from other countries. More recently, Aiginger and Davies (2004), studying the industrial specialization of European countries, shows that the integration of markets widens the consumption and competition horizons among world markets. As the competition between countries intensifies, Porter (1990) suggests that economies have focused the majority of their resources on industries where they have a competitive advantage, resulting in specialization in the output (Ricci, 1999).

The finance literature shows that as countries become more specialized in their output, firms in these countries face stiffer competition in raising funds from the local market (Bikker and Haaf, 2002). Further, this increased competition tends to cause investors to require higher returns for their investment as they have several similar investment options in those industries (Dodd, 2013). Consequently, over the last two decades, cross-listing has become an increasingly vital strategy for firms. Coupled with the operations of firms becoming global, the ability to directly raise foreign capital through foreign listing is of great importance to firms (Aiginger and Davies, 2004). Similarly, investors from overseas markets are presented with risk diversification options as firms

cross-list. However, recounting the motivation for cross-listing, previous studies show that firms seek foreign listing for two broad reasons; increased access to funds and positive market outcomes. The marker outcomes include increased analyst coverage (Baker *et al.* 2002), improved information environment (Bris *et al.* 2012), improved liquidity (Bacidore and Sofianos, 2002, and Berkman and Nguyen, 2010) better corporate governance (King and Segal, 2003, Karolyi, 2012, and Li *et al.* 2015) and business strategy (Pagano *et al.* 2002, and Dodd, 2013). Previous studies have shown that these outcomes are enabled in markets with specific characteristics, making it essential to understand how market characteristics impact the cross-listing host choices of firms (Pagano, Randl, Röell, and Zechner, 2001).

From an international economics perspective, since the new evidence on the host market choices of firms by Krugman (1991), several studies have examined firms' choice of host markets. For example, Cheng (2007) examines the location choices of firms in China using a nested logit model. He shows that regional potentials motivate the location choices of firms. Devereux, Griffith, and Simpson (2007) report that firms are interested in agglomeration effects, while government grant policies have a low impact on the choice of the host market of firms. Studies in this regard extend from the operational host market choices of firms to the foreign listing choices of firms.

Studies on cross-listing patterns have shown considerable cross-listing dynamics on the traditional host markets over the past recent years. For example, Doidge, Karolyi, and Stulz (2009) examine the dynamics in the volumes of cross-listing on the NYSE and the LSE. They show that the dynamics are associated with the shifts in host market characteristics, including stock market characteristics. Markets, including the US, UK, French, and German markets, were the most dominant in years preceding the late 1990s due to their unique market characteristics (Dodd, 2013). The late 1990s saw high competition among global stock markets to attract foreign firms, causing considerable variations in the number of listing on these traditionally dominant markets (Doidge *et*

al. 2009). Studies explain these patterns using country characteristics such as disclosure standards, legal environment, proximity variables, as well as economic performance. For example, Sarkissian and Schill (2016b) study the cross-listing waves and shows the relevance of the gravity model in explaining international cross-listing patterns. They further show that firms consider the pricing efficiencies of the host market. Abdallah and Ioannidis (2010) use a modified global asset pricing model and show that firms cross-list when they have strong domestic performance. They also postulate that by cross-listing, firms take advantage of their prospective growth opportunities.

Notwithstanding this evidence, studies on the determinants of the cross-listing decision and the choice of the host market ignore how the specialization in output in both the local and host markets could explain cross-listing decisions of firms, as suggested by Pagano *et al.* (2002). Following the reasoning of Lane and Milesi-Ferretti (2008), which argues that country characteristics motivate asset allocation, we draw from the international economics literature on specialization in output to explain the cross-listing decisions of firms.

We follow the international economics and cross-listing literature that argues that firms' cross-listing decisions and the choice of the host market are motivated by the characteristics of the local and host markets. We conjecture that specialization in output suggests competition among firms for funds. Such competition can drive firms to seek funds from foreign markets through cross-listing. We also conjecture that firms may pursue or avoid cross-listing in countries that are specialized in a given industry.

3.3 Data and Descriptive Statistics

This study aims to examine how specialization in output influences the cross-listing decisions and the choice of the host country. We utilize data from the Organization for Economic Co-operation and Development (OECD) countries for the period 1995 to 2014. The OECD sample provides a range of economies that are specialized across different industries. This data, therefore, enables us to provide a comprehensive examination of this relationship over a reasonably long period. Also, OECD countries show evidence of higher predisposition towards maintaining specialization in output for particular industries and exhibit high reluctance to de-specialize in short to medium term, making it suitable for this study (Dalum, Laursen, and Villumsen, 1998). *Table B.3* (in Appendix) provides the list of sample countries and the number of firms.

For the list of cross-listed firms, we employ the DataStream database. For each given cross-listing, the database provides details of the local and host countries, types of listing instruments including Close-Ended funds, Exchange-traded funds (ETF), American Depository Receipts (ADR), General Depository Receipts (GDR), common and preferences shares. The initial sample consists of 4961 firms from 34 OECD countries, which includes dead/delisted firms, merged and acquired firms, close-ended funds, exchange-traded funds, preference shares, and, most importantly, involuntary listings. Following Doidge *et al.* (2009) and Sarkissian and Schill (2016), we consider only cross-listing, which are firm-initiated. Doidge *et al.* (2009) and Sarkissian and Schill (2016) suggest that the use of firm-initiated cross-listings are significant in the examination of the determinants of cross-listing decisions as they indicate a throughout-decision.

Further, we include the value of cross-listing pairs for all sample periods. It is essential to mention that the frequency of the data meant that there was at least one cross-listing for each sample year, thus the inclusion of all cross-listing pairs without excluding any periods of no cross-listings.

However, we ignore listings in Germany and Latvia; for data inconsistency and selection criteria failure reasons, respectively[21].

Next, we compare the cross-listing data from *DataStream* for the US to that provided by the Bank of New York Mellon Corporation and JP Morgan Chase and Co. websites. The Bank of New York and JP Morgan ADR depository websites provide cross-listing data (mostly ADRs and GDRs) from selected markets with emphasis on the US. For the US, the current study considers only firms listed on 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 higher listing requirements, better shareholder protection frameworks, and disclosure requirements. They are also two of the most desired host equity markets in the US for most cross-listing firms (Doidge *et al.* 2009, and Abdallah and Ioannidis 2010). The implementation of the selection criteria leaves the sample standing at 1779 from 34 OECD countries. This reduction does not affect the implication of our results, given that the inclusion of the excluded firms will provide unrealistic and biased results with flawed economic consequences.

For firm-level analysis, we employ 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 the logarithm of the 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* (*Table B.2* provides data definition and source). Also, to understand whether industry trends motivate these results, we create an industry aggregate of cross-listings by summing the firm-level data by industry. We present industry codes and the number of firms in *Table B.1* (in Appendix).

[21] The sample does not include cross-listing from Germany due to the data size and discrepancies. Foreign listed firms in Latvia showed to be only OTCs.

A large body of literature shows that market development of both the local and host markets determines the cross-listing decision and the choice of the host market (Hargis, 2000, Claessens *et al.*, 2006, and Korczak and Korczak, 2013). In particular, Claessens *et al.* (2006) show that firms from developed markets engage in more cross-listing compared to those from developing markets. They base their argument on the premise that firms from developed markets cross-list in response to the need of foreign investors who prefer firms from markets with sound fundamentals. Korczak and Korczak (2013), on the other hand, shows that firms from developing markets engage in more cross-listing to seek markets with more robust fundamentals. They further suggest that cross-listing reduces as the local market develops and becomes more robust. Therefore, we employ market development indicator, market capitalization scaled by Gross Domestic Product ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of the local (country i) and host (country j) markets. This enables us to capture their impact on corporate cross-listing decisions. We also employ data on specialization in the output of the local and host market, measured as the value-added to the Gross Domestic Product (GDP) by each industry[22]. We extract this data from the OECD National Accounts Statistics database. Given that specialization data is categorized by the International Standard Industrial Classification (ISIC) Revision 4, we match our sample firms with their corresponding ISIC coding[23].

We use data on bilateral trade relationships between the local and host country extracted from the Structural Analysis (STAN) database, measured by the bilateral exports between the local and host markets. By adopting this data, we can capture existing bilateral trade linkages between the local and host markets and their impact on cross-listing decisions for both countries. Common to the gravity models in international trade literature, we employ a considerable number of dummy variables that capture common bilateral cultural factors. These factors include contiguous

[22] https://data.oecd.org/

[23] 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

($Contigious_{i,j}$), common language ($Com\_Language_{i,j,t}$), common region ($Com\_Region_{i,j,t}$), distance ($Distance_{i,j,t}$) and a common legal framework ($Legal\_system_{i,j,t}$) from the French Research Centre in International Economics (CEPII)[24].

Table 3.1 presents the summary statistics for the main variables adopted in this study. It categorizes them under local market (country i) and host market (country j) characteristics, firm characteristics, and bilateral factors for the period 1995 to 2014. We observe a relatively similar median and mean values for both the local and host markets' output concentration ($Con_{i,k,t}$). These initial statistics are quite intuitive based on the background that most of the sample countries are developed markets, with specialized outputs. We also observe low standard deviations for all financial performance variables ($ROA_{i,k,t}$, $ROCE_{i,k,t}$, and $GPM_{i,k,t}$). This observation may suggest that the financial performance of the sample firms is generally similar. 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, most of the variables are positively skewed with the logarithm of sales scaled by the 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. To check the stationarity of the series, we implement the Augmented Dickey-Fuller (ADF) test and report that the series is stationary. *Tables 3.2* provides the correlation matrix of the variables. The maximum and minimum correlation values suggest the absence of any multicollinearity concerns.

[24] http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp

Table 3. 1: Descriptive Statistics for Firm-level Analysis

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	ADF
$Share_{i,j,k,t}$	0.014	0.013	0.051	0.001	0.005	30.565	1495.432	-70.72***
$Con_{i,k,t}$	0.024	0.015	0.096	0.003	0.003	5.379	47.220	-48.64***
$Con_{j,k,t}$	0.023	0.014	0.396	0.001	0.028	3.500	29.397	-60.92***
Country Characteristics								
$MKT\_CAP_{i,t}/GDP_{i,t}$	0.095	0.095	0.397	0.001	0.048	69.304	474.549	-126.45***
$MKT\_CAP_{j,t}/GDP_{j,t}$	0.016	0.014	0.397	0.001	0.095	30.964	194.280	-123.82***
$GDP_{i,t}$	2.280	2.820	3.050	0.226	0.015	-0.277	25.963	-61.49***
$GDP_{j,t}$	2.760	2.720	3.080	0.226	0.015	4.598	22.578	-45.34***
Firm Characteristics								
$ROA_{ik,t}$	0.009	0.005	0.067	-0.002	0.105	-145.805	22395.240	-46.25***
$ROCE_{ik,t}$	0.029	0.072	0. 330	-0.001	0.005	-162.637	26492.990	-52.58***
$GPM_{i,k,t}$	0.006	0.003	0.296	-0.042	0.033	-99.897	12002.710	-233.16***
$(Sales/GDP)_{ik,t}$	0.043	0.027	0.114	-0.015	0.238	27.601	974.978	-78.21***
$(Total\ Assets /GDP)_{i,k,t}$	0.016	0.004	0.413	0.001	0.093	20.928	646.720	-45.91***
Bilateral Factors								
$Legal\_system_{i,j,t}$	0.563	1.000	1.000	0.000	0.496	-0.253	1.064	-90.44***
E$xport_{i,j,t}/GDP_{i,t}$	0.063	0.015	0.203	0.023	0.012	5.181	47.846	-76.71***
$Distance_{i,j,t}$	0.008	0.007	0.010	0.004	0.001	-0.121	1.694	-90.44***
$Com\_Region_{i,j,t}$	0.630	1.000	1.000	0.000	0.483	-0.381	1.145	-90.44***
$Com\_Language_{i,j,t}$	0.408	0.000	1.000	0.000	0.492	-0.026	1.001	-90.44***
$Contigious_{i,j,t}$	0.301	0.000	1.000	0.000	0.459	0.615	1.378	-90.44***

Notes: The table shows the summary statistics for all variables used in the firm-level analysis. It shows the summary statistics for 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 the log of the 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 $(Total\ Assets/GDP)_{i,k,t}$. It also provides the summary statistics for the 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 a common legal framework ($Legal\_system_{i,j,t}$) employed in this study. The table also shows the employed country market development variables including, market capitalization scaled by Gross Domestic Product ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of the local (country i) and host (country j). This allows us to examine their impacts on the cross-listing host choices of firms. Details of variable definitions and sources are given in *Table B.2*.

Table 3. 2: Correlation Matrix (Firm-Level)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. $Share_{i,j,k,t}$	1																	
2. $Con_{i,k,t}$	-0.020	1																
3. $Con_{j,k,t}$	-0.026	0.124	1															
4. $MKT\_CAP_{i,t}/GDP_{i,t}$	-0.016	-0.010	-0.056	1														
5. $MKT\_CAP_{j,t}/GDP_{j,t}$	-0.111	-0.018	0.159	0.025	1													
6. $GDP_{i,t}$	-0.038	-0.163	0.053	0.188	0.242	1												
7. $GDP_{j,t}$	-0.110	0.107	-0.195	0.173	-0.420	-0.142	1											
8. $ROA_{ik,t}$	0.034	-0.019	0.010	-0.055	0.022	-0.032	-0.035	1										
9. $ROCE_{ik,t}$	0.001	0.002	0.000	0.010	-0.012	0.013	0.008	0.026	1									
10. $GPM_{i,k,t}$	0.003	0.006	0.013	-0.008	0.010	0.013	-0.017	0.049	0.000	1								
11. $(Sales/GDP)_{ik,t}$	0.159	-0.026	-0.012	-0.018	0.052	-0.002	-0.195	0.025	0.002	0.004	1							
12. $(Total\ Assets/GDP)_{i,k,t}$	0.205	-0.042	-0.004	-0.022	0.081	-0.002	-0.257	0.027	0.002	0.005	0.887	1						
13. $Legal\_system_{i,j,t}$	-0.034	-0.124	0.007	-0.252	0.033	-0.341	-0.049	0.045	-0.007	0.010	-0.039	-0.029	1					
14. E$xport_{i,j,t}/GDP_{i,t}$	-0.017	-0.033	0.038	0.000	-0.257	-0.403	0.071	-0.011	-0.008	0.003	-0.028	-0.047	0.256	1				
15. $Distance_{i,j,t}$	-0.021	0.138	0.033	0.314	-0.118	0.315	0.220	0.009	0.010	0.017	-0.081	-0.107	-0.525	-0.139	1			
16. $Com\_Region_{i,j,t}$	0.060	-0.115	0.030	-0.340	-0.079	-0.394	-0.195	0.028	-0.007	-0.011	0.053	0.076	0.538	0.182	-0.838	1		
17. $Com\_Language_{i,j,t}$	-0.053	-0.070	0.044	-0.184	0.211	-0.212	0.014	0.011	-0.010	0.006	0.040	0.043	0.594	0.105	-0.349	0.302	1	
18. $Contigious_{i,j,t}$	-0.040	-0.141	-0.053	-0.278	0.174	0.002	-0.005	0.004	-0.012	0.004	0.045	0.048	0.502	-0.085	-0.680	0.582	0.579	1

Notes: The table shows the correlation matrix for all variables used in the industry-level analysis. It shows the correlation matrix of the industry-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 the log of the 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 $(Total\ Assets/GDP)_{i,k,t}$. It also provides the correlation matrix of the 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 a common legal framework ($Legal\_system_{i,j,t}$) employed in this study. The table also shows the correlation matrix of the employed country market development variables including, market capitalization scaled by Gross Domestic Product ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of the host (country i) and host (country j). This allows us to examine their impacts on the cross-listing host choices of firms. Details of variable definitions and sources are given in *Table B2*.

Similarly, *Table 3.3* presents the summary statistics for the industry characteristics, local and host market characteristics, and the bilateral linkages. 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 at the firm level to industry basis, allowing for industry analysis. From *Table 3.2*, we observe that the standard deviations of most of the variables indicate close dispersion around their means for both industry, local, and host country characteristics. Most of the variables are positively skewed except $ROA_{i,k,t}$, $ROCE_{i,k,t}$, $GPM_{i,k,t}$, $GDP_{i,t}$ 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 generalize that the data is not normally distributed, indicating general positive skewness and peaked. We test the stationarity of our variables by implementing the Augmented Dickey-Fuller (ADF) test and find the series to be stationary. *Tables 3.4* provides the correlation matrix of the variables. Again, the maximum and minimum correlation values suggest the absence of any multicollinearity concerns.

Table 3. 3: Descriptive Statistics for Industry Level Analysis

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	ADF
$Share_{i,j,k,t}$	0.076	0.075	0.396	0.001	0.001	23.589	840.729	-39.41***
$Con_{i,k,t}$	0.024	0.015	0.096	0.003	0.003	5.379	47.220	-42.69***
$Con_{j,k,t}$	0.023	0.014	0.396	0.001	0.028	3.500	29.397	-43.64***
Country Characteristics								
$MKT\_CAP_{i,t}/GDP_{i,t}$	0.100	0.100	0.400	0.007	0.051	0.976	5.430	-61.02***
$MKT\_CAP_{j,t}/GDP_{j,t}$	0.138	0.123	0.397	0.118	0.924	0.542	2.267	-53.18***
$GDP_{i,t}$	2.788	2.799	3.049	2.263	0.150	-0.119	2.556	-65.73***
$GDP_{j,t}$	2.751	2.727	3.049	2.263	0.150	0.385	2.641	-69.53***
Industry Characteristics								
$ROA_{ik,t}$	1.634	1.823	8.661	-4.605	1.034	-102.784	11129.790	-80.24***
$ROCE_{ik,t}$	2.114	2.219	7.168	-4.611	0.935	-114.393	13107.230	-77.30***
$GPM_{i,k,t}$	3.415	3.497	10.295	-2.659	0.720	-72.563	6343.959	-75.78***
$(Sales/GDP)_{ik,t}$	0.028	0.018	1.720	-5.276	0.682	15.923	343.582	-51.56***
$(Total\ Assets /GDP)_{i,k,t}$	0.057	0.056	0.446	0.000	1.609	14.181	301.607	-46.31***
Bilateral Factors								
$Legal\_system_{i,j,t}$	0.531	1.000	1.000	0.000	0.499	-0.126	1.016	-55.87***
$Export_{i,j,t}/GDP_{i,t}$	0.005	0.001	0.156	0.001	0.011	4.981	42.141	-83.05***
$Distance_{i,j,t}$	0.008	0.007	0.010	0.004	0.001	-0.082	1.882	-55.87***
$Com\_Region_{i,j,t}$	0.630	1.000	1.000	0.000	0.483	-0.538	1.290	-55.87***
$Com\_Language_{i,j,t}$	0.408	0.000	1.000	0.000	0.492	0.372	1.139	-55.87***
$Contigious_{i,j,t}$	0.301	0.000	1.000	0.000	0.459	0.868	1.754	-55.87***

Notes: The table shows the summary statistics for all variables used in the industry-level analysis. It shows the summary statistics for industry-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 the log of the 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 $(Total\ Assets/GDP)_{i,k,t}$. It also provides the summary statistics for the 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 a common legal framework ($Legal\_system_{i,j,t}$) employed in this study. The table also shows the employed country market development variables including, market capitalization scaled by Gross Domestic Product ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of the host (country i) and host (country j).

Table 3. 4:Correlation Matrix (Industry-Level)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. $Share_{i,j,k,t}$	1																	
2. $Con_{i,k,t}$	0.276	1																
3. $Con_{j,k,t}$	-0.019	0.263	1															
4. $MKT\_CAP_{i,t}/GDP_{i,t}$	-0.052	0.059	0.025	1														
5. $MKT\_CAP_{j,t}/GDP_{j,t}$	-0.099	0.016	0.081	0.000	1													
6. $GDP_{i,t}$	0.057	0.051	-0.046	0.231	0.058	1												
7. $GDP_{j,t}$	-0.111	-0.001	0.104	0.106	-0.296	-0.198	1											
8. $ROA_{ik,t}$	0.003	0.008	0.012	-0.020	0.002	0.001	-0.025	1										
9. $ROCE_{ik,t}$	-0.005	0.019	0.015	-0.047	0.033	-0.068	0.005	-0.006	1									
10. $GPM_{i,k,t}$	0.001	0.002	-0.002	-0.037	0.019	0.004	-0.028	0.090	0.041	1								
11. $(Sales/GDP)_{ik,t}$	-0.001	-0.022	-0.042	-0.029	0.169	0.035	-0.261	0.004	0.047	0.014	1							
12. $(Total\ Assets/GDP)_{i,k,t}$	0.000	0.008	-0.005	-0.012	0.193	0.076	-0.254	0.004	0.002	0.028	0.555	1						
13. $Legal\_system_{i,j,t}$	-0.037	0.038	0.020	-0.162	0.147	-0.184	-0.069	-0.013	0.050	-0.014	0.013	0.036	1					
14. E$xport_{i,j,t}/GDP_{i,t}$	0.013	0.046	-0.021	0.087	-0.095	-0.340	0.031	0.007	0.003	0.001	-0.035	-0.060	0.245	1				
15. $Distance_{i,j,t}$	-0.025	-0.109	-0.057	0.172	-0.248	0.220	0.261	0.007	-0.026	0.011	-0.131	-0.117	-0.451	-0.206	1			
16. $Com\_Region_{i,j,t}$	0.066	0.003	-0.061	-0.239	0.065	-0.194	-0.311	-0.013	0.011	-0.003	0.088	0.069	0.452	0.155	-0.768	1		
17. $Com\_Language_{i,j,t}$	-0.078	0.092	0.191	-0.091	0.189	-0.162	0.092	-0.016	0.038	-0.009	0.029	-0.014	0.511	0.144	-0.146	0.116	1	
18. $Contigious_{i,j,t}$	-0.035	0.043	0.037	-0.220	0.166	0.054	0.002	-0.022	0.025	0.000	0.045	0.009	0.473	-0.009	-0.647	0.590	0.412	1

Notes: The table shows the correlation matrix for all variables used in the industry-level analysis. It shows the correlation matrix for industry-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 the log of the 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 $(Total\ Assets/GDP)_{i,k,t}$. It also provides the correlation matrix for the 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 a common legal framework ($Legal\_system_{i,j,t}$) employed in this study. The table also shows the correlation matrix of the employed country market development variables including, market capitalization scaled by Gross Domestic Product ($MKT\_CAP_{i,t}/GDP_{i,t}$ and $MKT\_CAP_{j,t}/GDP_{j,t}$) of the host (country i) and host (country j). This allows us to examine their impacts on the cross-listing host choices of firms. Details of variable definitions and sources are given in *Table B.2*

3.4 Methodology

The study begins by examining the impact of local and host countries' specialization in output on corporate cross-listings decisions. Cross-listing is regarded as a form of international asset flow. Consequently, examining bilateral cross-listing flows between local and host countries will be comparable to modeling a gravity model for bilateral financial asset flow (Domowitz, Glen and Madhavan, 1998, and Foerster and Karolyi, 1999). The gravity model is conventionally used in the international trade literature to explain trade patterns between countries. The main implication of this model is that the bilateral flow of trade between a set of countries is subject to their economic sizes and the distance between those countries. Specifically, the gravity model suggests that good economic indicators attract trade between countries while greater distance weakens this attraction (Bergstrand, 1985, and Chițu, Eichengreen, and Mehl, 2013). Subsequently, we employ a gravity model for bilateral financial asset flow from the international trade literature (Lane and Milesi-Ferretti, 2008). Our model infers that the bilateral cross-listing volume between the host and the local country is a positive function of the local and host market's performance and proximity. The performance of the local and host countries is proxied by real Gros Domestic Product (GDP). Proximity is measured by the similarities between the host and local countries, based on the geographic distance, common language, common legal framework, and contiguousness in line with the gravity model (Chițu *et al.* 2013) [25].

The initial econometric model we derive from the general gravity framework is as:

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

[25] The data is from CEPII, 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 a firm (industry) k in the local market (country i) to a particular industry in the host country (country j) at time t. $Con_{i,k,t}$ represents the value-added (contribution to GDP) by industry k to the total national output of country i at time *t.* Similarly, $Con_{j,k,t}$ is the value added by industry k 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 specialization of both the local (country i) and host (country j) countries impacts corporate cross-listing decisions. $z_{i,k,t}$ is a matrix that represents firm(industry) specific characteristics including performance and profitability variables. These variables include Return on Assets ($ROA_{i,k,t}$) Return on capital employed ($ROCE_{i,k,t}$), Gross Profit Margin ($GPM_{i,k,t}$), the log of Sales scaled by the logarithm of real GDP ($(Sales/GDP)_{ik,t}$) and total assets scaled by real GDP $(Total\ Assets/GDP)_{i,k,t}$.

This study includes the 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 $MKT_{CAP\,j,t}/GDP_{j,t}$) following the gravity model. Dodd, Frijns, and Gilbert (2015) show that bilateral cultural/common factors immensely influence the cross-listing decision and the choice of the host market. Similarly, Bianconi and Tan (2010) show that firms from common law countries tend to have better corporate governance culture, thus fostering cross-listing to markets with a similar legal framework. 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 the legal framework ($Legal\_system_{i,j}$) consistent with the gravity model. The common bilateral variables are dummy variables that take the value of 1 if country i and country j share similar cultural factors and 0 if otherwise except distance variable ($Distance_{i,j}$). Distance is the distance between the capitals of country i and country j.

3.5 Estimation Results and Analysis

This section presents the estimation results of how the specialization in the output of local and host markets impacts the cross-listing decision and the choice of the host market. The section begins with a firm-level analysis and then an industry-level analysis.

3.5.1 Firm-Level Analysis

Table 3.5 presents results from the firm-level analysis for firms from country i to country j. We report the Pooled Ordinary Least Squares (OLS) with corrected standard error estimation results in column 1. T-statistics are presented in parenthesis.

Focusing on the main contribution of this paper, output concentration ($Con_{i,k,t}$) has a significant and positive impact on the cross-listing decisions and the choice of the host market. The finding suggests that firms from the local country (*i*) that specialize in a particular industry engage in more cross-listing compared to their less specialized counterparts. This might indeed be considered as a solid sign of firms seeking diversification of sources of funds as well as a means of firms seeking less competition. These results are also important indications that as local industries become more competitive through specialization, firms tend to spillover to other markets, following the findings by Claessens *et al.* (2001). Also, this finding is in line with Greenaway, Sousa, and Wakelin (2004), who show that the importation of multinational companies into the local market fosters stiffer competition. They again show that this competition results in local firms seeking new markets and creating an indirect spillover channel in new markets.

From the host market perspective, specialization in the output of the host country (*j*) ($Con_{j,k,t}$) has a significant and negative relationship on the cross-listing decisions of firms. The result suggests that firms from local markets (country i) that are less specialized in their output engage in less cross-listing in the host country (country j) that is specialized in their output. These

results are also in line with the firms' competition motivations literature, which suggests that firms seek host markets that have less competition. From other findings of this paper, the diversification of sources of funds motive outweighs the competition motive.

Table 3.5 also shows that country characteristic: the level of market development of the local country (i) measured by $MKT\_CAP_{i,t}/GDP_{i,t}$ has a positive and significant impact on the cross-listing decision and the choice of the host market of firms only when we control for both industry and year fixed effects. However, the market development of the host market ($MKT\_CAP_{j,t}/GDP_{j,t}$) has a negative and significant impact on the cross-listing decision and the choice of the host market. While this finding suggests that firms from rich and developed markets cross-list more on smaller economies, it further supports the initial results that firms look for less competitive markets while making the cross-listing decision (Claessens *et al.* 2006). The real GDP of the local country ($GDP_{i,t}$) is positive and significant for all four models, whereas the real GDP of the host country ($GDP_{j,t}$) is negative and significant. This finding follows the existing literature that argues that firms from developed markets engage in more cross-listing compared to their developing counterparts.

An examination of the firm characteristics show that 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 Pagano *et al.* (2002) and Lang *et al.* (2003). Also, $(Total\ Assets/GDP)_{i,k,t}$ is positive and significant, indicating that larger firms engage in more cross-listing compared to smaller firms (Dodd *et al.* 2015). The findings are intuitive, given that small, medium-sized, and non-profitable firms find it challenging to manage the initial cost cross-listing costs, as shown in the literature[26].

Results from the bilateral factors provide interesting points of discussion. First, Distance ($Distance_{i,j}$), common language ($Com\_Language_{i,j}$) and common region ($Com\_Region_{i,j}$) are

[26] See for example, Frijns *et al.* (2016)

positive and significant, suggesting that firms look for markets that are geographically further away from their local market, opposing the gravity rule. $Contigious_{i,j}$ is negative and significant, providing more evidence that firms seek diversification opportunities and suggest a weakening of the proximity bias. The finding can be viewed as an indication of firms seeking diversification outside proximate markets. Common legal system ($Legal\_system_{i,j}$) is negative and insignificant. $Export_{i,j,t}/GDP_{i,t}$ of the local market has a significant and negative impact on cross-listing decisions, suggesting that trade connections between countries negatively impact cross-listing, against the gravity argument indicated in the international finance literature[27]. The opposite and significant signs of the gravity equation variables (as opposed to the previous research by Frenkel *et al.* (2004), Aviat and Coeurdacier (2007), and Lane and Milesi-Ferretti (2008)) also support our argument that firms look for less competitive markets while making the cross-listing decision.

We control for industry fixed effects in column 2 and document an increase in the coefficients of $GPM_{k,t}$, $ROCE_{ik,t}$ and $ROA_{ik,t}$ but they become negative and insignificant. All other variables remain very similar to the initial coefficients in column 1. Similarly, Column 3 reports estimation results with time fixed effect controlled for, while column 4 reports estimation results with both industry-fixed effects and time-fixed effects controlled. The results from columns 2, 3, and 4 show little disparity to the initial results reported in column 1.

[27] We have employed Total trade/GDP variable as well, with similar results.

Table 3. 5: Determinants of cross-border listings: Analysis at the 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

Notes: The dependent variable ($Share_{i,j,k,t}$) is the share/ratio of cross-listing from industry k in country i to industry k in country j.*, ** and *** indicate that the coefficient is statistically significant at 10%, 5%, and 1% respectively. Variable definitions are given in *Table B.2*. Heteroskedasticity and Autocorrelation corrected standard errors are used for the estimation. T-statistics are presented in parenthesis. The ADF unit root test is implemented, and all variables are stationary, as shown in *Table 3.1*.

3.5.2 Industry Level Analysis

Table 3.6 presents the industry-level analysis of cross-listing decisions from country i to j. We sum up the cross-listing values and create industry aggregates and implement the models again aimed at providing an industrial perspective of the relationship. We report Pooled Ordinary Least Squares (OLS) with corrected standard error estimation results in column 1 *Table 3.6.* T-statistics are presented in parenthesis.

At the industry-level, specialization in output ($Con_{i,k,t}$) in the local market has a significant and positive impact on the cross-listing decision and the choice of the host market of firms. Similar to the firm-level estimation results, this suggests that industries with the highest contribution to the total national output of country i engage in more cross-listing compared to industries that contribute less. We also report that specialization in output in the host market is significant and negative. This finding supports the initial firm-level analysis in *Table 3.5* and suggests that at the industry level, firms seek less competition. The results also show that firms from local markets (i) with low specialization in the output of industry (k) do not engage in cross-listing to a host country (j) if the country (j) is specialized in that given industry. Our finding closely follows the arguments that sound fundamentals increase cross-listing.

Market development variables for both local (i) and host (j) countries are negative and significant, suggesting that industries in small countries cross-list more in larger economies. This finding is in line with the stream of literature, which proposes that firms cross-list as a result of weak local markets to seek better functioning host markets (Korczak and Korczak 2013). Real GDP of the local country ($GDP_{i,t}$) is 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 3.5*.

Profitability and performance variables follow those in the firm-level analysis. In particular, characteristics such as 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 and insignificant with only $ROA_{i,k,t}$ being significant. The result provides further support to the relevance of profitability to the cross-listing decision and the choice of the host market indicated in earlier results.

Common legal system ($Legal\_system_{i,j}$) has a negative and significant impact on the cross-listing decision and the choice of the host market of firms. While E$xport_{i,j,t}/GDP_{i,t}$ is 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. Together, the bilateral variables add to our argument that firms seek opportunities to diversify sources of funding. The results also suggest a weakening of the gravity rules in the international economics and finance literature.

Next, we control for industry fixed effect and time fixed effect in columns 2 and 3, respectively, and observe no significant changes to the results reported in column 1. However, $ROA_{i,k,t}$ becomes positive and significant. Column 4 reports the estimation results with control for both time and industry fixed effects, with no substantial changes to the initial results.

We further check the robustness of our results by firstly dividing the data into deciles based on industries that dominate a given country. We also create dummies by allocating the value of 1 to industries that dominate a given country and 0 otherwise. These control for the fact that specialization in specific industries of countries might not be comparable, given the differences in the economic size of countries. The results from this estimation are similar and provide support to findings shown in the main analysis at both the firm and industry levels [28].

[28] The results of these analyses are available upon request.

Table 3. 6: Determinants of cross-border listings: Analysis at the 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

Notes: Dependent variable ($\Delta Share_{i,j,k,t}$): the share/ratio of cross-listing from industry k in country i to industry k in country j.*, ** 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 as the coefficients are less than 1%. Variable definitions are given in *Table B.2*. Heteroskedasticity and Autocorrelation corrected standard errors are adopted for the estimation. T-statistics are presented in parenthesis. The ADF unit root test is implemented, and all variables are stationary, as shown in *Table 3.3*.

3.5.3 Robustness Checks: Dynamic GMM model analysis

Previous studies on the determinants of cross-listing decisions show that the bilateral cross-listing between the local and host market is likely to be influenced by existing cross-listings. (e.g., Benos and Weisbach, 2004). Benos and Weisbach (2004) argue that cross-listing in a given host market is associated with the success and the presence of firms from the same industry. This is likely to create a familiarity bias, especially for firms from the same country or industry (Leblang 2010). Consistent with this literature, our results shown in *Tables 3.5* and *3.6* could be a result of an existing cross-listing effect and the lag effects of the independent variable. To overcome this problem, we establish a difference Generalized Method of Moment model (GMM), which considers the lag of the dependent variable and the independent variables. We employ a panel GMM model with a first difference transformation and a white period-instrument weighting matrix. By implementing this method, we provide Heteroscedasticity and Autocorrelation Consistent (HAC) estimates of the standard errors and covariance matrix given in *Equation (1)*. Furthermore, we can test the robustness of our results by adopting the GMM model. The study used the difference GMM instead of the system GMM approach in line with Bond (2001). Bond (2001) indicates that if the estimated coefficient of the primary variable from the difference GMM approach is lower than that of the fixed effect approach, a systems GMM is appropriate. These conditions are not met; hence, the current study uses the difference GMM approach using the lags of both the dependent and independent variables as instruments. Again, based on Bond's criteria, we cannot conclude that the instruments used are weak.

The GMM model is expressed as:

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

Table 3.7 presents the firm-level GMM estimation results for the determinants of bilateral cross-listing decisions and the choice of the host markets between the local and host countries. We implement a first difference transformation panel GMM model with a period instrument weighting matrix. We test for first, and second-order correlation using Arellano-Bond (AB1 and AB2) tests and report the same in *Table 3.7.* The results from these tests yield P-values higher than 10%, which suggests that we do not have enough evidence of the presence of autocorrelation. The results from the first and second-order correlation tests further validate the use of suitably lagged endogenous variables as instruments. Moreover, we test for over-identification restrictions, and the P-values are higher than 10%. We, therefore, fail to reject the null hypothesis that the instruments used are exogenous in our model.

We document some important results from the GMM estimations. The results of the GMM estimation show that the lag of the dependent variable is positive and significant to the cross-listing decision and the choice of the host market. This finding suggests that existing cross-listings influence the bilateral cross-listing between the local and host countries for a given period. The result could be due to the success experienced by firms already cross-listed in such markets, which follows the familiarity bias argument (e.g., Dodd *et al.,* 2015). Specialization in the output of the local market ($Con_{i,k,t}$) has a positive and significant impact on the dependent variable, consistent with initial results in the model (1). However, the output concentration of the host market ($Con_{j,k,t}$) remains negative, yet insignificant.

We also find that local 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), which shows that less developed local markets engage in more cross-listing as compared to developed ones. The market development of the host market ($MKT\_CAP_{j,t}/GDP_{j,t}$) is negative and insignificant. The GDPs of both the local and host markets are negative and insignificant. It can be

inferred that the findings are similar to those reported in the previous examinations in the OLS analysis.

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 normalized by the logarithm of real GDP of the local market $(Sales/GDP)_{ik,t}$ is negative and significant while total assets scaled by real GDP of local country, $(Total\ Assets/GDP)_{i,k,t}$, is positive and significant. Bilateral factor, $Export_{i,j,t}/GDP_{i,t}$ although negative is not significant. In a nutshell, for most of the variables, these results are consistent with our initial findings, with limited variations.

Table 3. 7: Determinants of cross-border listings: GMM Analysis at the 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)
$\Delta(otal\ Asses/GDP)_{i,k,t}$	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

Notes: Dependent variable ($\Delta Share_{i,j,k,t}$): the change in the share/ratio of cross-listing from industry k in country i to industry k in country j.*, ** and *** indicate that the coefficient is statistically significant a t 10%, 5%, and 1% respectively. T-statistics are presented in parenthesis. First Difference GMM model with white period-instrument weighting matrix is implemented, providing heteroscedasticity consistent estimates of the covariance matrix.

Table 3.8 presents the industry-level GMM estimation results. Similar to the firm-level analysis in *Table 3.7*, we implement a first difference transformation panel GMM model with the period-instrument weighting matrix. We test for first and second-order correlation using Arellano-Bond (AB1 and AB2) tests. The P-values are higher than 10%, implying we do not have enough evidence of the presence of autocorrelation, further validating the use of suitably lagged endogenous variables as instruments. Again, we test for over-identification restrictions, and the P-values 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 variable ($Share_{i,j,k,t-1}$) remains positive and significant. Also, the output concentration of the local country ($Con_{i,k,t}$) is a positive and significant determinant of cross-listing, emphasizing our initial findings in *Tables 3.5*, *3.6*, and *3.7*. Although the specialization in the output of the local country ($Con_{j,k,t}$) is negative, it is not significant.

Similar to the findings in *Table 3.6* and consistent with Korczak and Korczak (2013), market development of the local country ($MKT\_CAP_{i,t}/GDP_{i,t}$) shows that less developed markets engage in more foreign listing. This finding could be due to more significant financing opportunities in some overseas markets, as demonstrated by previous studies on the motivation of cross-listing. For firm characteristics, we observe inconsistent results similar to earlier results shown in *Table 3.4*. Exports normalized by real GDP ($Export_{i,j,t}/GDP_{i,t}$) of the local 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 minor variations in some variables, most of the results support the initial results.

Overall, results from both the Ordinary Least Square (OLS) examination and the General Method of Moments (GMM) suggest that specialization in output motivates the decision to cross-list and the choice of the host market. The results provide evidence of firms seeking markets that are less competitive in their industry. Other findings from both the firm and industry-level analyses suggest the existence of the familiarity bias in the cross-listing decision and the choice of the host market, as reported in the cross-listing literature.

Table 3. 8: Determinants of cross-border listings: GMM Analysis at the 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

Notes: Dependent variable ($\Delta Share_{i,j,k,t}$): the change in the share/ratio of cross-listing from industry k in country i to industry k in country j.*, ** 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 is implemented, providing heteroscedasticity consistent estimates of the covariance matrix.

3.6 Conclusion

The current paper examines how specialization in the output of the local and host markets influences the cross-listing decision and the choice of the host market at both the firm and industry-levels. The study utilizes bilateral cross-listing data for 34 countries from the OECD. Countries from the OECD are generally specialized in their output, which enables us to undertake this study. The study implements selection criteria in line with recent literature, which leaves the sample of firms standing at 1779 from 34 OECD countries. This reduction does not affect the implication of our results, given that the inclusion of the excluded firms will provide unrealistic and biased results with unusable economic inferences. The study also collects firm-level, country-level, and common bilateral factors data for the examination.

The study makes important contributions to the existing cross-listing literature. First, the overall results of this study show that firms from markets which are specialized in their output engage in more cross-listing compared to firms from markets that are not. More interestingly, we document that these firms cross-list to markets, which are weak in the given industry. Second, we provide a strong indication that the need to diversify funding sources motivates the cross-listing decisions of firms. However, it is also evident that firms prefer markets that will offer less industrial competition for funding compared to those with higher industrial competition for funding. Third, the results suggest the weakening of the proximity bias/preference as firms show evidence cross-listing in markets that are further from their local market. This finding provides support for the argument that firms give more relevance to the funding diversification motive than proximity preferences.

The results of this study have important policy implications. First, the findings of this study suggest that firms tend to spillover to other foreign countries through cross-listing. This spillover is motivated by the specialization in the output of the local market. Second, this study shows that competition and diversification motives encourage corporate cross-listing decisions and the choice

of the host market. However, other findings of this study suggest that the diversification of sources of funding motive outweigh the motive to compete for capital.

Appendix

Table B. 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
Wholesale 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

Notes: *Table B.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 B. 2: Variable definitions and sources

Variable	Definition	Source
$Share_{i,j,k,t}$	Share/ratio of cross-listing from industry k in country i to industry k in country j	Manually calculated by the author
$Con_{i,k,t}$	The concentration of output of industry/firm k in country i	OECD statistics database
$Con_{j,k,t}$	The concentration of output of industry/firm k in country j	OECD statistics database
$MKT\_CAP_{i,t}/GDP_{i,t}$	The total market capitalization of all listed firms in country i scaled by real GDP of country i	DataStream
$MKT\_CAP_{j,t}/GDP_{j,t}$	The total market capitalization of all listed firms in country j scaled by real GDP of country j	DataStream
$ROA_{ik,t}$	Return on Assets of a firm (industry) k	DataStream
$OCE_{ik,t}$	Return on capital employed of a 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 or common law)	Central Intelligence Agency's World Fact Book
$Export_{i,j,t}/GDP_{i,t}$	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 the distance between country i and country j based on the bilateral distance between their largest cities	CEPII
$Com\_Region_{i,j,t}$	Dummy variable that takes 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 a 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 borders and 0 if otherwise	CEPII
$(Sales/GDP)_{i,k,t}$	Log of Net sales of a firm (industry) k scaled by the log of real GDP of country i	DataStream
$(Total\ Assets /GDP)_{j,k,t}$	Total Asset of a firm (industry) k scaled by real GDP of country j	DataStream
$GDP_{i,t}$	The log of real Gross Local Product of country i	OECD statistics database
$GDP_{j,t}$	The log of real Gross Local 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 center which provides international economics database on world economies and their evolution.

Table B. 3: List of Sample Countries and Number of Firms

country set i	*Number of Firms*
Australia	43
Austria	5
Belgium	5
Canada	54
Chile	66
Czech	7
Denmark	9
Finland	9
France	30
Hungary	21
Iceland	1
Ireland	16
Israel	29
Italy	73
Japan	4
Luxembourg	21
Mexico	68
Netherlands	43
New Zealand	10
Norway	10
Poland	35
Portugal	4
Spain	19
Sweden	26
Switzerland	588
Turkey	2
United Kingdom	210
United States	371
Total	1779

Notes: Table B.3 shows the home countries and the corresponding number of firms cross-listed.

CHAPTER FOUR

Cross-Listing flows under uncertainty: an international perspective

This study examines how Economic Policy Uncertainty (EPU) in the local and global markets impacts corporate cross-listing decisions. To this end, we employ corporate and country-level data from 1990 to 2016 from 13 countries. We implement a Granger Causality, Quantile on Quantile Regression (QQR), and Wavelet Coherence approaches. We find that local and global EPU influence the cross-listing decisions of firms, with a more substantial impact on firms from smaller local markets. Our results suggest that firms from smaller local markets seek more cross-listing in the face of high local EPU and reduce or avoid cross-listing during periods of high global EPU. The findings suggest that policy transparency could have important implications for current and future corporate decisions.

4.1 Introduction

Studies have long shown that the economic fabric of countries influences corporate decisions and strategies. However, recent studies note that uncertainties about economic policies have a similar impact (Kang, Lee, and Ratti, 2014, Wang, Chen, and Huang, 2014, Gulen and Ion, 2015, and Zhang, Han, Pan, and Huang, 2015). These studies explain that economic policies shape the economic fabric and characteristics of countries. A vital element of these arguments is that policy uncertainty signals fear about current and future market characteristics. Subsequently, a large body of literature documents that periods of high policy uncertainty hinder firm growth and expansions, in addition to other vital decisions. Policy uncertainty gained research traction when recent topical international events and national policy debates provided evidence of adverse impact on corporate

operations and decisions. In particular, policy discussions during the US election, the BREXIT referendum, tax reform debates in the UK, US-China trade disagreements among others showed significant contribution to high Economic Policy Uncertainties (henceforth, EPU) with significant implications for corporations (Baker, Bloom, and Davis, 2016, Bordo, Duca, and Koch, 2016, Zeng, Zhong, and He, 2019, and Xu, 2020)[29]. Several studies investigate the magnitude of this impact and report essential revelations. For example, Handley and Limao (2015) find that firms' export investments reduce during periods of high policy uncertainty. Gulen and Ion (2015) report lower firm capital investments during periods of high economic policy uncertainty while Zhang *et al.* (2015) postulate that periods of high EPU result in reduced mergers and acquisitions decisions. While these studies focus on corporate decisions that involve sizeable corporate expenditure, a large part of their examination is founded on economic policy uncertainty in the local market. The current study provides an analysis of how economic policy uncertainty in both the local and global markets impacts corporate cross-listing decisions.

With over 2,000 cross-listed firms on the NYSE, about 1800 on the LSE, over 20,000 American Depository Receipts (ADRs) and Global Depository Receipts (GDRs) on several stock markets across the globe, cross-listing has shown to be of high relevance to firms[30]. The extant cross-listing literature argues that cross-listing conventionally presented firms the option of raising foreign capital, especially firms from developing economies (Khurana *et al.* 2007; Choi *et al.* 2009). In addition to raising foreign capital, cross-listed firms report increased analyst coverage (Baker *et al.* 2002), improved information environment (Bris *et al.* 2012), improved liquidity (Bacidore and Sofianos 2002, and Berkman and Nguyen 2010) better corporate governance (King and Segal 2003, Karolyi 2012, and Li *et al.* 2015) and improved revenue (Pagano *et al.* 2002, and Dodd 2013). Coffee (2002), Lang *et al.* (2003), and Korczak and Korczak (2013) argue that these benefits are

[29] See for example, Caggiano *et al.* (2017), who shows higher volatility in unemplyment rates during periods of high economic policy uncertainties.
[30] The figures are the aapproximation of cross-listing figures from the LSE, NYSE, BNY Mellon and World Federation of Exchanges websites

possible due to the macroeconomic characteristics in the local and host markets, which stems from government policies. Thus, the decision to cross-list to a specific host market depends on the market characteristics in both the local market and the prospective host market.

The impact of market characteristics on cross-listing decisions and the choice of the host market is inconclusive. The literature presents two opposing arguments. The first argument proposes that sound local market fundamentals motivate cross-listing. For example, Claessens *et al.* (2006) find that firms from high-income economies with sound macro policies, efficient legal systems, greater market openness, and high growth prospects engage in more cross-listing. This proposition is argued from an investor perspective and shows that investors in the host market are likely to patronize firms from markets with sound fundamentals. This line of argument suggests that firms from markets with sound fundamentals seek cross-listing in an attempt to meet the needs of such investors.

The second argument suggests that the decision to cross-list and the choice of the host market is motivated by poorly functioning local markets, with inadequate minority shareholder protection and inefficient regulatory systems (e.g., Karolyi 2004, Korczak and Korczak, 2013). This argument builds on the premise that cross-listing provides a means of listing on host markets with more robust functioning markets. Pagano *et al.* (2002) add to this argument and indicate that countries with more reliable corporate governance standards attract more cross-listing from countries with weaker ones[31]. Supporting the latter evidence, Korczak and Korczak (2013), indicate that the number of cross-listings reduces as the local market becomes more developed. Pagano *et al.* (2001) further assert that firms from European countries tend to cross-list on markets that are liquid, large, and where firms from their industry are already cross-listed. These two streams of arguments suggest that market characteristics are significant in the cross-listing decision and provide evidence that firms might be seeking positive market outcomes associated with sound

[31] This is mainly attributed to information environment argument presented by Domowitz *et al.* (1998)

markets. Despite this evidence, the direction of this impact is unclear. This study builds on previous discussions that argue that government policies drive market characteristics. We postulate that if policies drive and form the basis of market characteristics, uncertainties about them should be significant for the cross-listing decision (e.g., Hall 1989, and Collier and Dollar 2001).

More importantly, periods of high local EPU may have several implications for firms seeking to cross-list as well as other firms. First, firms may be discouraged from borrowing from banks during high local EPU periods. For example, Zhang *et al.* (2015) show that firms reduce their leverage ratio during periods of high local economic policy uncertainty. They highlight that firms revert to using retained earnings and equity as sales and profits drop during high EPU periods. Second, lenders are likely to increase the risk premium and demand higher interests as the risk of default increases during periods of higher local EPU. For example, Manzo (2013) indicates that a 10% increase in uncertainty leads to a 3% increase in risk premium demanded by lenders. These propositions suggest that firms may increase their cross-listing activities during periods of high local economic policy uncertainty as other sources of finances may be more expensive. However, higher local EPU may also lead to firms cutting their investment expenditure, as shown by previous studies. The cutting of investment might imply a reduction in the need to raise funds from foreign markets through cross-listing (Gulen and Ion, 2015). Thus, though periods of high local EPU may drive firms abroad, there is also a possibility it may discourage foreign listing as the need for additional funds may vanish.

Given this background, we examine how cross-listing decisions and the choice of the host market respond to shocks to local and global EPU. To measure economic policy uncertainty, we resort to the monthly EPU index of Baker *et al.* (2016) for 13 countries for the period 1990 to 2016. Baker *et al.* (2016) construct a weighted average frequency count of news articles that contain words that connote uncertainty about a country for each month. For example, the US EPU index comprises

of three main components, news-based, tax-based, and forecasters' disagreements as keywords. Higher EPU values generally indicate higher economic uncertainty, while lower EPU values suggest lower economic uncertainty for each sample month for each country. We then source data on the total market value of cross-listing for each month for each sample country and scale them by the monthly market capitalization of the local market.

The empirical examination begins with an initial Granger Causality test to test for causality. We then adopt a Quantile on Quantile Regression (QQR) approach, and a Wavelet Coherence (WC) approach to investigate how local and global EPU impact the cross-listing decisions of firms. The Granger Causality approach provides an initial indication of the correlation between the present values of cross-listing decisions of firms and the present and lag values of EPU. However, the Granger Causality approach does not provide enough evidence of this relationship. We address this by implementing two contemporary methods; a Quantile on Quantile Regression approach and a wavelet coherence approach. These approaches help us to ascertain an in-depth understanding of the relationship between cross-listing decisions and local and global EPU.

Results from the Quantile on Quantile and Wavelet Coherence approaches show that periods of high local economic policy uncertainty leads to increased cross-listing. In contrast, periods of high global economic policy uncertainty discourages cross-listing. These results are related to recent studies that document a negative impact of local EPU on firm expansionary decisions (e.g., Wang, Chen, and Huang, 2014, and Zhang *et al*. 2015). However, the current study differentiates itself from recent studies by providing both a time-varying and market-level perspective. The findings suggest that smaller economies respond more to local EPU by intensifying cross-listing during high EPU periods compared to their larger counterparts. Again the results show this relationship is time-variant and dynamic across different quantiles and frequencies of both EPUs and cross-listing decisions.

This study makes significant contributions to the literature. It offers a thorough examination of how policy uncertainty impacts the decision to cross-list. While the findings show that local EPU motivates cross-listing, we observe that market size and development mitigate this impact.

4.2 Related Literature

Economic Policy changes and their impacts are well studied, although these studies show mixed results. For example, Engel, Hayes, and Wang (2007) show an increase in the number of privatization of firms after the passage of the Sarbanes Oxley (SOX) Act of 2002 in the US. Zhang (2007) finds a negative cumulative abnormal return during the SOX Act passage. However, recent discussions indicate that due to the documented outcomes of previous policy changes, uncertainties about future policy changes and their effects have increased with a more significant impact on corporate decisions (Baker *et al.* 2016). For example, Zhang *et al.* (2015) indicate that firms tend to use internal funds during periods of economic policy uncertainty. Bonaime *et al.* (2018) argue that the rate of mergers and acquisitions reduce significantly during periods of high economic policy uncertainty. Brogaard and Detzel (2015) document that an increase of one standard deviation in EPU results in a 1.5% increase in forecasted three-month abnormal returns. These studies, among others, are indicative of the fact that EPU is a significant economic risk factor that generally has implications for corporate decisions and strategies. We contribute to this discussion by examining how EPU influences the cross-listing decisions of firms.

Earlier studies on cross-listing argued that the motivation for cross-listing was to raise additional funds that were not readily available in the local markets (Lang *et al.* 2003, Khurana *et al.* 2007, and Sarkissian and Schill 2016). However, recent studies show that additional to raising funds, firms cross-list for other reasons (Choi *et al.* 2009, Berkman and Nguyen 2010, and Korczak

and Korczak 2013). For example, Pagano *et al.* (2002) show that firms cross-list to improve liquidity, increase visibility, for better corporate governance, and as part of their expansionary business strategy. Dodd (2013) indicates that these motivations are skewed towards both local and host market characteristics than firm-specific characteristics. Doidge *et al.* (2009) support this argument by noting that although firms may possess similar characteristics, foreign firms prefer a US listing to other markets due to specific peculiar market characteristics. All these studies, among others, emphasize the relevance of market characteristics for the cross-listing decisions of firms.

An extensive literature show that market characteristics are founded on government policies, economic or otherwise. For example, Devarajan, Swaroop, and Zou (1996) emphasize a strong relationship between government policies on expenditure and total economic growth. They also argue that sectors of an economy that receive more government budgets tend to show more significant development structurally and become increasingly efficient. These actions encourage growth and make those sectors more attractive to foreign corporations that operate in the same or similar sectors. Studying the influence of government policies on economic activities, Pastor and Veronesi (2012) indicate that changes in government policies influence both the targeted sector as well as other sectors closely or remotely connected to the targeted sector. They also show that government policies dictate the macroeconomic and institutional frameworks of a given economy on which economic activities thrive or fail. Thus, further emphasizing the relevance of government economic policies in determining the market structure and characteristics of a given country. They also infer that uncertainty about government policies is likely to influence the general confidence of market stakeholders and their decisions.

Studies on the influence of Economic Policy Uncertainty (EPU) on firm decisions focused on how either idiosyncratic or general uncertainty influenced corporate operations with more emphasis on firm investment and capital structure. For example, Rodrik (1991) indicates that firms withhold investments until residual uncertainty about policies and reforms is eliminated. Gulen and

Ion (2015) show that policy uncertainty can depress corporate investments by inducing a precautionary delay because of investment irreversibility. In agreement with this notion, they further argue that minimum levels of policy uncertainty could lead to considerable repercussions in firms' drive to invest. Specific to Economic Policy Uncertainty, Wang *et al.* (2014), among others, emphasize that firms reduce their investment as EPU increases, and vice versa[32]. Julio and Yook (2012), using the elections period as a proxy of EPU, argue that periods of economic and political uncertainty are accompanied by some 4.8% reduction in firm investment expenditure. These studies focus primarily on corporate decisions that involve cost.

A scant body of literature considers the influence of policy uncertainties on corporate capital structures. For example, Wang *et al.* (2014) postulate that during periods of policy uncertainties, firms tend to use internal sources of funds, eschewing the benefits of external funding. They argue that this decision is mainly a result of higher interest rates demanded by lenders during periods of high uncertainty. Myers (1984) examines how firms decide on their sources of funds. He showed that firms consider the potential future macroeconomic outlook of their respective countries in determining their current and future sources of funds. Supporting this argument, Titman and Wessels (1988) examine theories of firm optimal capital structure and indicates that firms' decisions on sources of funds are dependent on attributes that are responsible for the various costs or benefits associated with a given type of financing option. They emphasize, additional to firm-specific characteristics, that future expectations about the overall economic outcomes play a vital role in determining both the choice and the associated cost of the financing option. Feng (2001) argues that typically, firms' investments and capital structure are closely linked to government economic policies as these policies indicate the direction of the economy. Thus, unlike other forms of uncertainties, economic policy uncertainty is exogenous, making it of grave importance to firm decisions. While cross-listing might not be considered a conventional capital structure decision, its

[32] See for example, Kang *et al.* (2014)

ability to generate foreign funding among other positive market outcomes qualifies it as a potential source of financing for firms.

Given this background, this study investigates how and to what extent EPUs in the local and host markets influence corporate cross-listing decisions. Of significant note is the fact that periods of high local EPU may have two broad implications in the cross-listing decision. First, it is common knowledge in recent literature that periods high local EPU may discourage firm borrowing. For example, Zhang *et al.* (2015) show that firms reduce their leverage ratio during periods of high local economic policy uncertainty. Their study document that firms revert to using retained earnings and equity as sales and profits drop during high EPU periods. Also, lenders are likely to increase the risk premium and demand higher interests as the risk of default increases during periods of high local EPU. Second, high local EPU may also lead to firms reducing their investment activities; thus, their investment expenditure, as shown by previous studies. Such a reduction in investment might reduce the need to raise foreign capital through cross-listing.

Subsequently, periods of high local EPU is likely to either encourage cross-listing due to the higher cost of funding in the local market or reduce cross-listing activities due to the reduction in the need for foreign capital. This study addresses these issues and contributes to the ongoing discussions by examining how EPU influences the decision to cross-list.

4.3 Data and Descriptive Statistics

In this paper, we analyze the relevance of local and global EPU in the cross-listing decisions of firms. We utilize data of firms from 13 countries for the period 1990 to 2016, based on the availability of the EPU Index developed by Baker *et al.* (2016) and continuity of the cross-listing data[33]. The EPU Index measures the level of general uncertainty at the national level using several underlying components. For example, the US EPU comprises of data on the ratio of policy-related economic uncertainty newspaper coverage, the number of tax code provisions set to expire, and lastly, the level of disagreement among economic forecasters about the prospects of a given country. While this is only for the US, other countries use other phrases that suggest similar policy uncertainty. Together with different keywords that indicate economic policy-related uncertainty, these components proxy the level of general economic uncertainty in each country measured monthly. High EPU values show higher economic uncertainty, while low EPU values show lower economic uncertainty in each month. We adopt the EPU index at both the local market level and the global market levels to examine how each level of economic policy uncertainty (EPU) influences the cross-listing decisions of firms.

For the cross-listing data, we source data on the monthly values of cross-listings from each sample local market in a given month to different host markets from DataStream. Common to the literature, we normalize the cross-listing values by the market capitalization values of each local market, which controls for the effect of large firms having a better capacity to undertake more cross-listing than smaller firms (King and Segal, 2003). Thus, also controlling for the impact of outlier observations. We follow Sarkissian and Schill (2016) and consider only firm-initiated cross-listings while ignoring all non-equity listing due to data unavailability. By undertaking this exercise, we can only study cross-listings that are results of management decisions and not those of agents, in line with

[33] Baker *et al.* (2016) develop and introduce a measure of Economic Policy Uncertainty for 19 countries, which this study adopts.

existing studies. We also ignore delisted, merged, and suspended firms as standard in the literature (Pagano *et al.* 2001, Berkman and Nguyen, 2010, and Karolyi, 2012). Although this might raise survival bias concerns, Karolyi (2012) explains that the inclusion of delisted or merged firms might lead to miscounting, while a large number of data would be lost. Berkman and Nguyen (2010) provide support for the assertion of Karolyi (2012) and indicate the Sarbanes Oxley Act saw a lot of foreign cross-listed firms either delisting from US markets or merging with other local or foreign firms to meet the new requirements. Including these firms are likely to lead to erroneous inferences and conclusions.

Table 4.1 presents the summary statistics for the value of cross-listing, local EPU, and global EPU. We observe relatively similar averages of 2.05 local EPU for larger countries, including the US, UK, Germany, and Canada. This initial summary could be because of the limited policy changes in these countries (Van Stel and Suddle, 2008). Similarly, we also observe that the standard deviation of cross-listing for all countries is around 1 except Korea. This exception could be explained by the strong influence the Korean government has on the internationalization and cross-listing decisions of firms (Kim, 2003). We also observe relatively higher maximum cross-listing values for the US and UK, which is expected as the US, and the UK have shown continuous higher and increasing cross-listing in other foreign markets (Sarkissian and Schill, 2016). For the standard deviation of local EPU, we observe considerable variations, which could be an indication of the differences in the economic characteristics of each sample country. For the UK, we see particularly the highest local EPU value, which could be due to national events, including the BREXIT referendum, which spurred the level of uncertainty about the future economic prospects after BREXIT (Baker *et al.* 2016). From the global EPU values, we observe mean values that are similar to those of local EPU for smaller economies (Sweden, Spain, Korea, France, and Ireland) except Italy. Larger economies (US, UK, Germany, Japan, Canada) display larger local EPU than global. Skewness and kurtosis values show a relatively limited dataset; thus, results are not outlier driven.

Table 4. 1: Country-wise Descriptive Statistics

Country	Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis
Australia	EPU	1.94	1.95	2.52	1.41	0.20	0.07	3.49
	CL	2.87	2.94	5.72	0.35	1.09	-0.20	2.78
Canada	EPU	2.05	2.06	2.65	1.48	0.22	0.03	2.58
	CL	3.15	3.24	5.99	0.09	0.98	-0.45	3.74
France	EPU	2.05	2.06	2.65	1.05	0.28	-0.35	3.07
	CL	3.66	3.75	7.44	0.51	1.15	0.07	3.23
Germany	EPU	2.05	2.05	2.66	1.45	0.20	-0.11	2.83
	CL	3.50	3.46	7.84	0.38	1.30	0.26	3.22
Ireland	EPU	1.95	1.98	2.37	1.30	0.25	-0.63	2.88
	CL	3.17	3.22	7.25	0.46	1.19	0.47	4.94
Italy	EPU	2.05	2.09	2.39	1.50	0.15	-0.67	3.11
	CL	3.36	3.31	6.09	-0.02	0.99	-0.39	4.01
Japan	EPU	1.99	1.98	2.38	1.69	0.13	0.60	3.32
	CL	3.87	3.97	6.92	1.26	0.92	-0.13	3.36
Korea	EPU	1.96	1.96	2.61	1.35	0.23	-0.06	2.61
	CL	3.89	3.90	4.35	3.20	0.41	-0.56	2.40
Netherlands	EPU	1.97	1.99	2.37	1.43	0.13	-0.33	4.97
	CL	3.58	3.59	6.87	0.25	1.06	-0.15	3.67
Spain	EPU	1.92	1.82	2.61	1.37	0.19	0.86	3.98
	CL	0.73	2.00	1.20	0	1.41	3.46	19.89
Sweden	EPU	1.98	1.99	2.29	1.73	0.09	-0.16	2.67
	CL	3.11	3.09	5.73	0.93	0.98	0.13	2.65
UK	EPU	2.00	1.89	3.06	1.40	0.29	0.81	3.02
	CL	4.36	2.00	8.10	0	7.69	6.03	52.30
US	EPU	2.02	2.00	2.45	1.65	0.15	0.38	2.91
	CL	4.73	4.65	9.08	1.26	1.26	0.66	4.94
Global	EPU	1.98	1.93	2.45	1.71	0.14	0.84	3.72

Notes: EPU is the monthly local Economic Policy Uncertainty index for each sample country; CL is the monthly values of cross-listing for each sample country. CL values are multiplied by 10,000, given most CL values are below 1%.

4.4 Empirical Analysis

4.4.1 Granger Causality

This study examines how economic policy uncertainty influences the cross-listing decisions of firms. We start our analysis by first adopting the Granger Causality methodology introduced by Engle and Granger (1987). This method detects the causal relationship between global EPU and cross-listing and then local EPU and cross-listing. Granger Causality examines the correlation between present values of cross-listing decisions of firms and the present and past values of economic policy uncertainty[34]. The Granger Causality estimation model is expressed as:

$$CL_t = a_1 + \sum_{j=1}^{k} \alpha_i CL_{t-j} + \sum_{j=1}^{k} \beta_i EPU_{t-j} + \varepsilon_{it} \quad (1)$$

where CL_t is the monthly log value of cross-listing from a given country to different host markets at a given time. CL_{t-j} is the lag of CL_t, EPU_{t-j} is the lag aggregate economic policy uncertainty value for each given country, while ε_{it} is the error term in *Equation (1)*.

Table 4.2 shows the Granger Causality estimation results between local EPU and cross-listing and also indicates those between global EPU and cross-listing. The results suggest that global EPU granger causes cross-listing for firms from Japan, Korea, Sweden, and Australia. We also observe that for firms from Australia, Germany, Ireland, Italy, Korea, and the Netherlands, local EPU granger causes cross-listing. Though we are unable to conclude on the impact of either global or local EPU on the cross-listing decisions, we can generalize from *Table 4.2* that firms from smaller economies tend to be influenced by both global and local EPUs. These results further suggest, in line with the cross-listing literature, that firms cross-list on foreign markets to benefit from the better

[34] Following Cheung and Lai (1995) and common to the application of the Granger causality methodology and time series analysis, we test for unit root in the data using the Augmented Dickey-Fuller (Case *et al.* 2000) test and find that we have strong evidence to reject the unit root hypothesis.

economic conditions (Baker *et al.* 2002, Dodd, 2013, and Korczak and Korczak, 2013). We postulate that EPUs strongly captures these economic conditions. However, the results from the Granger Causality approach fail to provide strong evidence of causality from EPU to cross-listing.

Table 4. 2: Granger Causality Test

Country	Global_EPU	Local_EPU
Australia	3.32***	2.49**
Canada	1.09	1.24
France	1.06	0.23
Germany	0.34	2.02*
Ireland	1.32	2.61**
Italy	1.52	0.25***
Japan	2.50*	0.435
Korea	3.87**	0.03***
Netherlands	0.49	4.72***
Spain	0.89	0.97
Sweden	0.99***	1.49
UK	0.89	0.94
US	1.71	0.49

Notes: The table prints the F-statistics that show whether Global EPU or Local EPU Granger cause cross-listing. The dependent variable for the Granger Causality model is CL, which is the value of the cross-listings from the sample countries for each month from January 1990 to December 2016. *, ** and *** indicate that the F-tests are statistically significant at 10%, 5%, and 1%, respectively.

4.4.2 Quantile on Quantile Estimation

Although the results from the Granger Causality test highlight how elements of both local and global could predict cross-listing decisions, the results do not provide strong evidence of the causal relationship. We adopt a Quantile on Quantile Regression (QQR, henceforth) approach to curbing this.

The QQR approach, as introduced by Koenker and Bassett (1978), provides a scope to examine how the quantiles of a given variable influence those of another variable based on a blend of nonparametric and quantile estimation. Generally regarded as an extension to the OLS estimation approach, the quantile regression distinguishes itself by showing the dependencies between two variables at different quantile distributions. Thus, quantile regressions estimate the impact at the tails of the distribution of the dependent variable, enabling a comprehensive examination of the effect of the independent variable on the dependent variable. The nonparametric component of the QQR model allows for the dimensionality difficulty linked with the nonparametric model. Thus, adopting the QQR approach offers the ability to examine the dependence of one variable on another, showing a piece of more detailed information on the relationship compared to the OLS, among other standard approaches.

For this study, we set up a QQR model that seeks to examine how local and global EPU separately influences the decision to cross-list. Our QQR model can be expressed as:

$$CL_t = \beta^{\emptyset}(EPU_t) + \alpha^{\theta} CL_{t-1}\varepsilon_t^{\emptyset} \quad (1)$$

where CL_t proxies the total value of shares cross-listed from a given country in month t. EPU_t represents the local or global Economic Policy Uncertainty value or a given country in month t. $\emptyset$ is the $\emptyset th$ quantile of the conditional distribution of cross-listing while $\varepsilon_t^{\emptyset}$ is the error term whose

conditional $\emptyset th$ quantile equals zero. Following Sim and Zhou (2015) $\beta^{\emptyset}$ (.) is allowed to be unknown, given that we are unable to associate any prior information for the cross-listing and EPU relationship.

To examine how the $\emptyset th$ quantile of local and global EPUs relate to the th quantile of cross-listing, we study Eq. (1) in the neighborhood of EPU^{τ}. With $\beta^{\emptyset}$ (.) unknown, we estimate the function by taking a first-order Taylor expansion a quantile EPU^{τ} which results in Eq. (2) given as

$$CL_t = \beta^{\emptyset}(EPU_t) \approx \beta^{\emptyset}(EPU^{\tau}) + \beta^{\emptyset'}(EPU^{\tau})(EPU_t - EPU^{\tau}) \quad (2)$$

where $\beta^{\emptyset}$ is a proxy that represents the marginal effect and a partial derivation of $\beta^{\emptyset}(EPU_t)$ relating to EPU. It could also be regarded similar to the slope coefficient in a linear regression setup. Both $\beta^{\emptyset}(EPU^{\tau})$ and $\beta^{\emptyset'}(EPU^{\tau})$ are functions of $\emptyset$ and τ are functions and can, therefore, be expressed as $\beta_0(\emptyset, \tau)$ and $\beta_1(\emptyset, \tau)$ respectively. With this in mind, *Equation (2)* can then be rewritten as

$$\beta^{\emptyset}(EPU_t) \approx \beta_0(\emptyset, \tau) + \beta_1(\emptyset, \tau)(EPU_t - EPU^{\tau}) \quad (3)$$

We can also modify Eq. (1) by replacing the derivation from Eq. (3) into Eq. (1) which provides the expression:

$$CL_t = \beta_0(\emptyset, \tau) + \beta_1(\emptyset, \tau)(EPU_t - EPU^{\tau}) + \varepsilon_t^{\emptyset} \quad (4)$$

where Eq. (4) provides the quantile on quantile dependence between the cross-listing decisions of firms and local and global EPU. However, estimating Eq. (4) requires replacing EPU_t with an estimated proxy $\widehat{EPU_t}$ while replacing EPU^{τ} with $\widehat{EPU^{\tau}}$. By solving Eq. (5), we obtain the local

linear estimates of parameters b_0 and b_1, which are also the estimates of β_0 and β_1. Eq. (5) is given as:

$$\min_{b_0,b_1} \sum_{i=1}^{n} \rho_\theta \left[CL_t - b_0 - b_1\left(\widehat{EPU_t} - \widehat{EPU^\tau}\right)\right] K\left(\frac{F_n(\widehat{EPU_t}) - \tau}{h}\right) \quad (5)$$

Where $\rho_\theta(\mu)$ proxies the quantile loss function while h represents the kernel bandwidth parameter. To weigh the observations in the neighborhood of EPU^τ, we adopt the Gaussian Kernel approach. This approach is widely used in finance and economics studies for its simple computation and efficiency. The Gaussian Kernel approach is symmetric around zero and allocates low weights to observations farther away from the neighborhood of $\widehat{EPU^\tau}$ based on bandwidth h. The weights are inverse to the distance of $\widehat{EPU_t}$ from $\widehat{EPU^\tau}$.

Common to most approaches, the selection of a suitable bandwidth could prove problematic. Specifically, while choosing a small bandwidth could reduce bias estimates, it increases the variances. On the other hand, the selection of a large bandwidth could increase the bias estimate but reduce the variance. Thus, the choice of a bandwidth that minimizes both the bias and variance is imperative. We follow Sim and Zhou (2015) and choose a bandwidth parameter where $h = 0.05$.

4.4.3 Quantile on Quantile Regression Results

This section presents the estimation results of the QQR approach adopted in this study. The approach shows the dependence between cross-listing decisions of firms and local and global EPUs. Estimating this relationship using the QQR approach requires the selection of quantiles of local and global EPU (indexed by τ) while showing how such τ-quantiles of local and global EPU influences the $\emptyset$-quantiles of cross-listing. Given that we are interested in how local and global EPUs affect the cross-listing decision, we begin our analysis by investigating the dependence between local EPU and cross-listing. The results of the QQR approach are reported in the two-dimensional plots presented in *Figure 4.1*.

Figure 4.1 provides three detailed results about the dependence between cross-listing and local EPUs, which the Granger Causality estimations are unable to reveal. First, we report a positive (sea blue color) relationship between the quantiles of Local EPUs of most of the sample countries and the quantiles of the outbound cross-listing from those countries. The results suggest that periods of high economic uncertainty encourage foreign listing. This finding is in line with the existing literature that argues that macroeconomic conditions play a significant role in the decision to cross-list, as firms seek foreign listing to raise foreign funds (e.g., Hargis and Ramanlal, 1998, Silva and Chávez, 2008, Hostak, Lys, Yang, and Carr, 2013, and Korczak and Korczak 2013). The findings also provide supporting evidence to the body of literature that reports that cross-listing is motivated by poorly functioning local markets. Second, notwithstanding the reported general positive dependence, we observe considerable heterogeneity across the sample countries. A natural reason could be either the variation in the local market characteristics, including size and level of competition for funding (e.g., Pagano *et al.* 2002).

Third, we find significant variations of the slope coefficient ($\beta^{\emptyset}$) at different quantiles of local EPU and cross-listing for each sample country. These variations suggest that the dependency

between local EPU and cross-listing is subject to the magnitude of local EPU shocks and potentially the ability of the local market to absorb such shocks. It is worth noting that while *Figure 4.1* shows a generally positive (sea blue) dependence between local EPU and cross-listing, the relationship is most potent at extreme local EPU levels. This finding suggests that firms decide to cross-list when local EPU is at its highest whereas, low and medium local EPU might not generate significant cross-listing decisions. The results provide support to the arguments of Korczak and Korczak (2013). They document that poor local market conditions foster cross-listing decisions but also report that the magnitude of cross-listing reduces as fundamentals in the local market improve.

At the country level, we report a pattern for both developed markets and developing markets. Specifically, we find that the most substantial connection between local EPU and cross-listing is shown in weaker markets. In contrast, more advanced equity markets such as the US, UK, and Germany show a limited influence of local EPU. While market size, among other market characteristics, can be cited as a potential reason for this finding, these markets are among the first choice for cross-listing. Thus, local EPU is more likely to influence the inflows of cross-listings than outflows (Doidge *et al.* 2009). It is also essential to indicate that Korea, in particular, does not have enough quantile observations to draw any substantial conclusions.

Similar to *Figure 4.1*, *Figure 4.2* provides a two-dimensional presentation of the Quantile on Quantile estimation of the relationship between global EPU and cross-listing. Mainly, *Figure 4.2* shows the relationship between the quantiles of global EPU and the quantiles of cross-listing for each given sample country. *Figure 4.2* provides interesting results from three perspectives; general, quantile, and country perspectives. We observe a general negative relationship between global EPU and cross-listing decisions. This finding suggests that firms are not motivated to cross-list when global economic policy uncertainty is high. A possible explanation is that periods of high global EPU generally indicates that most potential host markets are likely to be facing similar high local EPU. Thus, cross-listing during such periods might result in low patronage and financial loss,

given the costs involved in cross-listing (Domowitz *et al.* 1998; Lang *et al.* 2003; Khurana *et al.* 2007; Choi *et al.* 2009). Another potential explanation is the fact that firms may reduce their investment expenditure during periods of high global EPU, which might reduce the need to seek foreign funds through cross-listing.

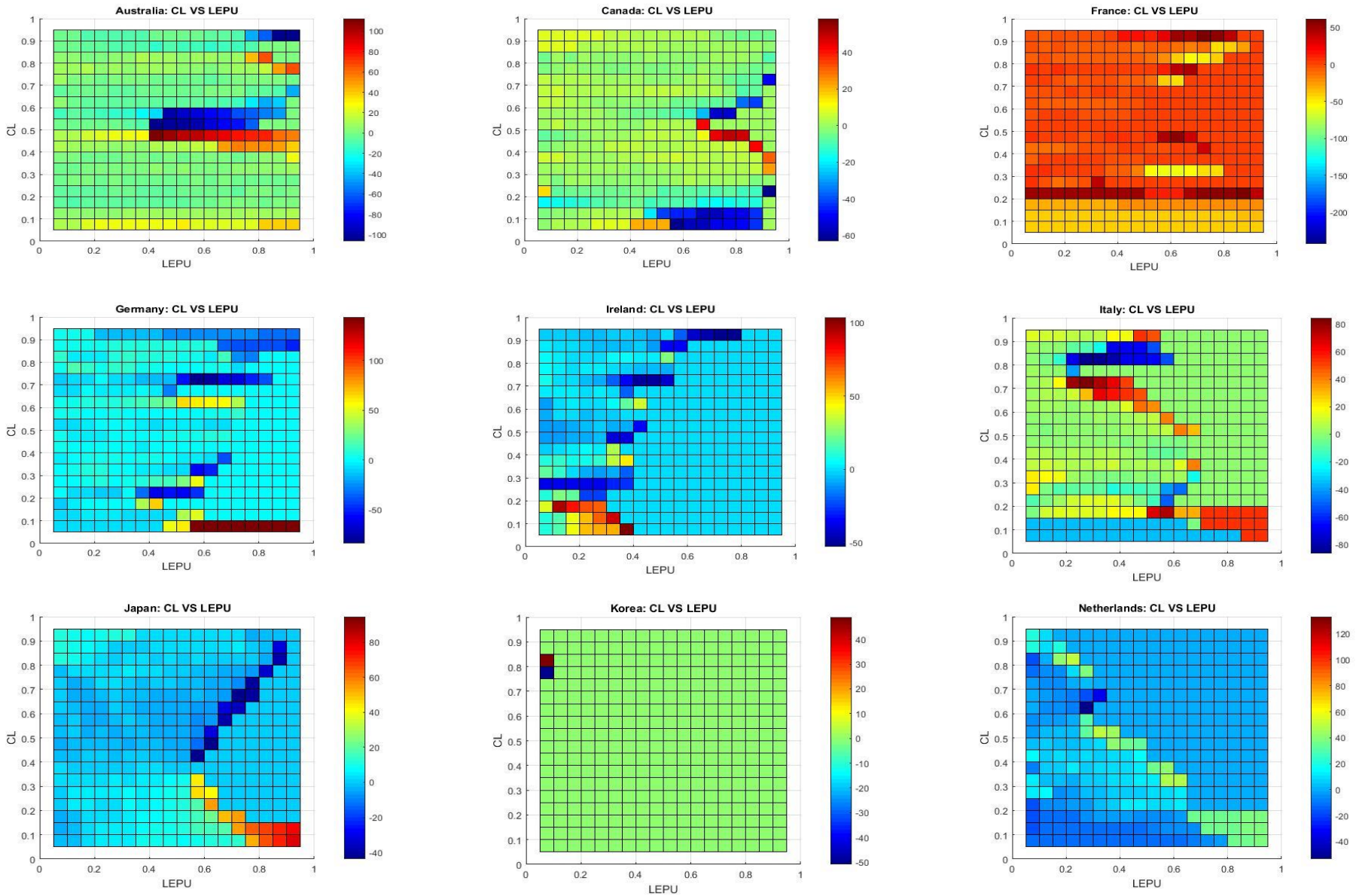
We also document significant variations in the dependence for different quantiles of both global EPU and cross-listing. Similar to *Figure 4.1*, this finding suggests that different global EPU shocks result in different shocks in cross-listing. Higher global EPU (higher quantiles of global EPU) discourages high cross-listing (higher quantiles of cross-listing). We further note that this relationship becomes weaker at lower quantiles of both global EPU and cross-listing. Our results suggest that while higher global EPU may signal higher general global uncertainty, low to medium global EPU may indicate that there are still host markets that might be doing well enough to encourage cross-listing from some markets. Thus, the dependence between global EPU and cross-listing is more pronounced as global uncertainty heightens.

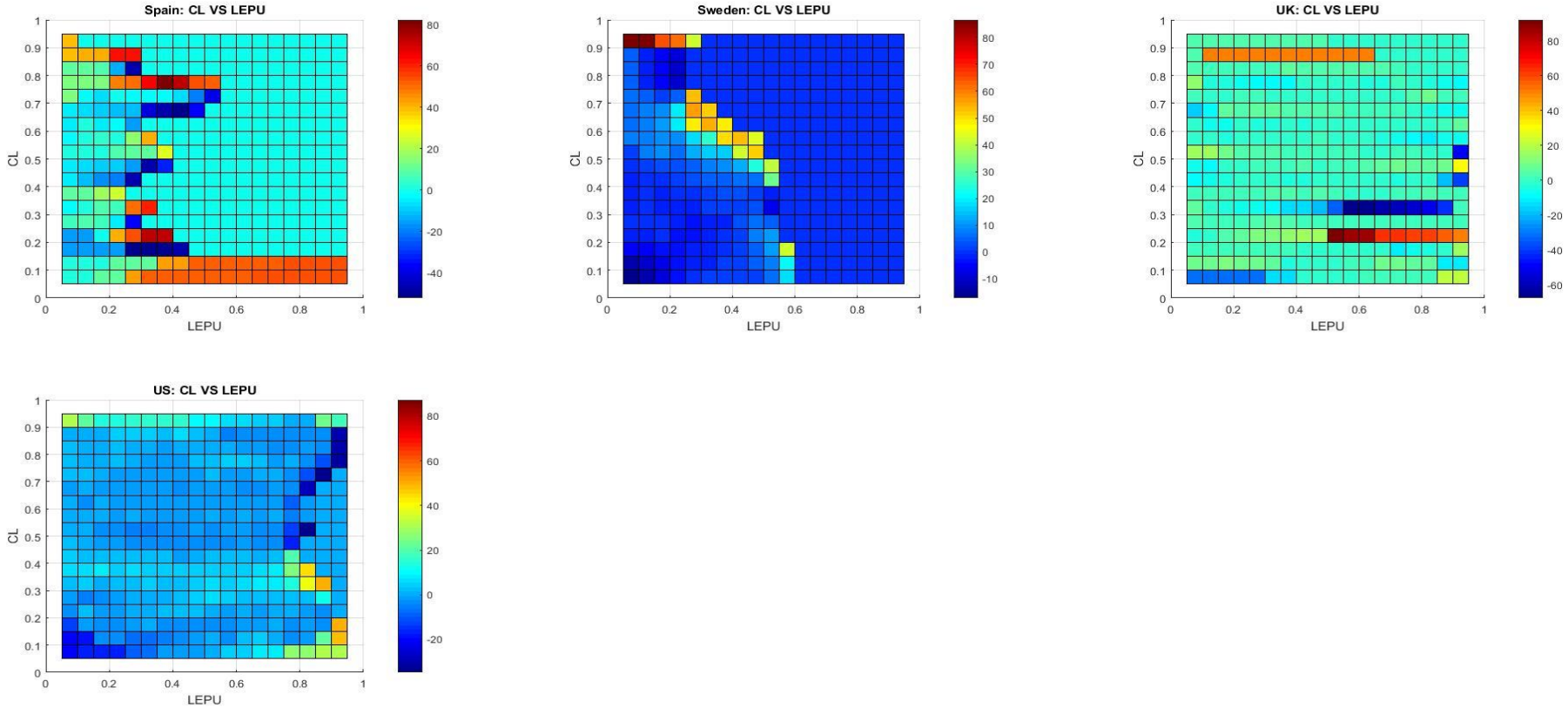
A country-level examination reveals the role of country dynamics in the global EPU and cross-listing relationship. While we observe the most potent negative relationship at higher quantiles of global EPU and cross-listing for most sample countries, some countries show mild impact. Consistent with *Figure 4.1*, we find that larger economies tend to be less affected by global EPU compared to smaller economies. In particular, the US, UK, Germany, and Canada show the most substantial dependence when global EPU is approaching its highest rather than at its highest. A possible reason could be that these markets tend to be net transmitters of EPU compared to smaller economies, which are net receivers (Klößner and Sekkel 2014, Yin and Han, 2014, and Bernal, Gnabo, and Guilmin, 2016).

Though the QQR approach provides a comprehensive picture of the relationship between local EPU and cross-listing and then global EPU and cross-listing, the method estimates the

relationship at a given period. In this regard, a QQR approach could be regarded as similar to a cross-sectional estimation that tests the relationship between variables at a given time. Thus, the QQR approach is unable to show the dynamics in this relationship over time.

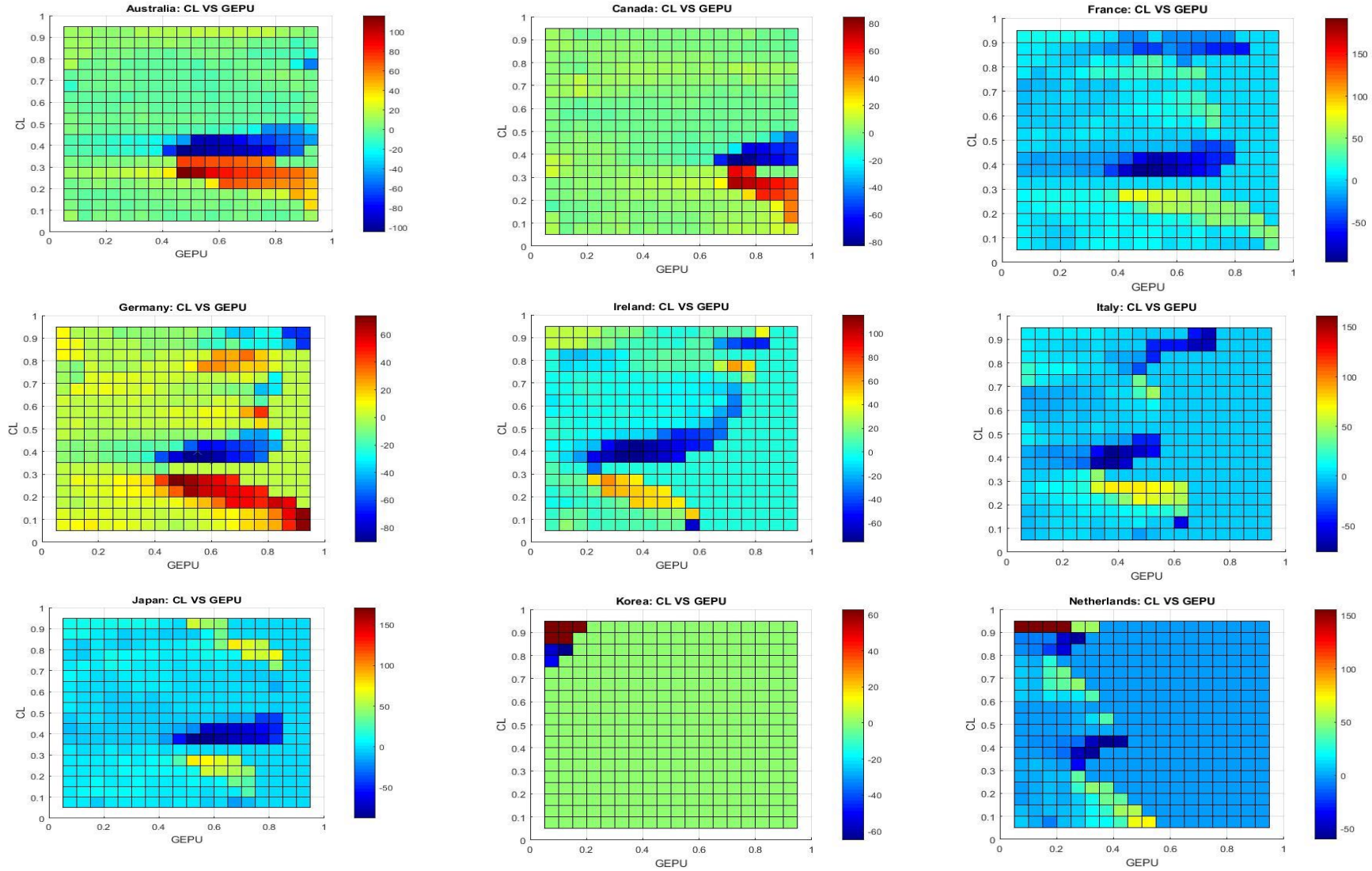
Figure 4.1: Quantile on Quantile Estimation for Local EPU and Cross-Listing

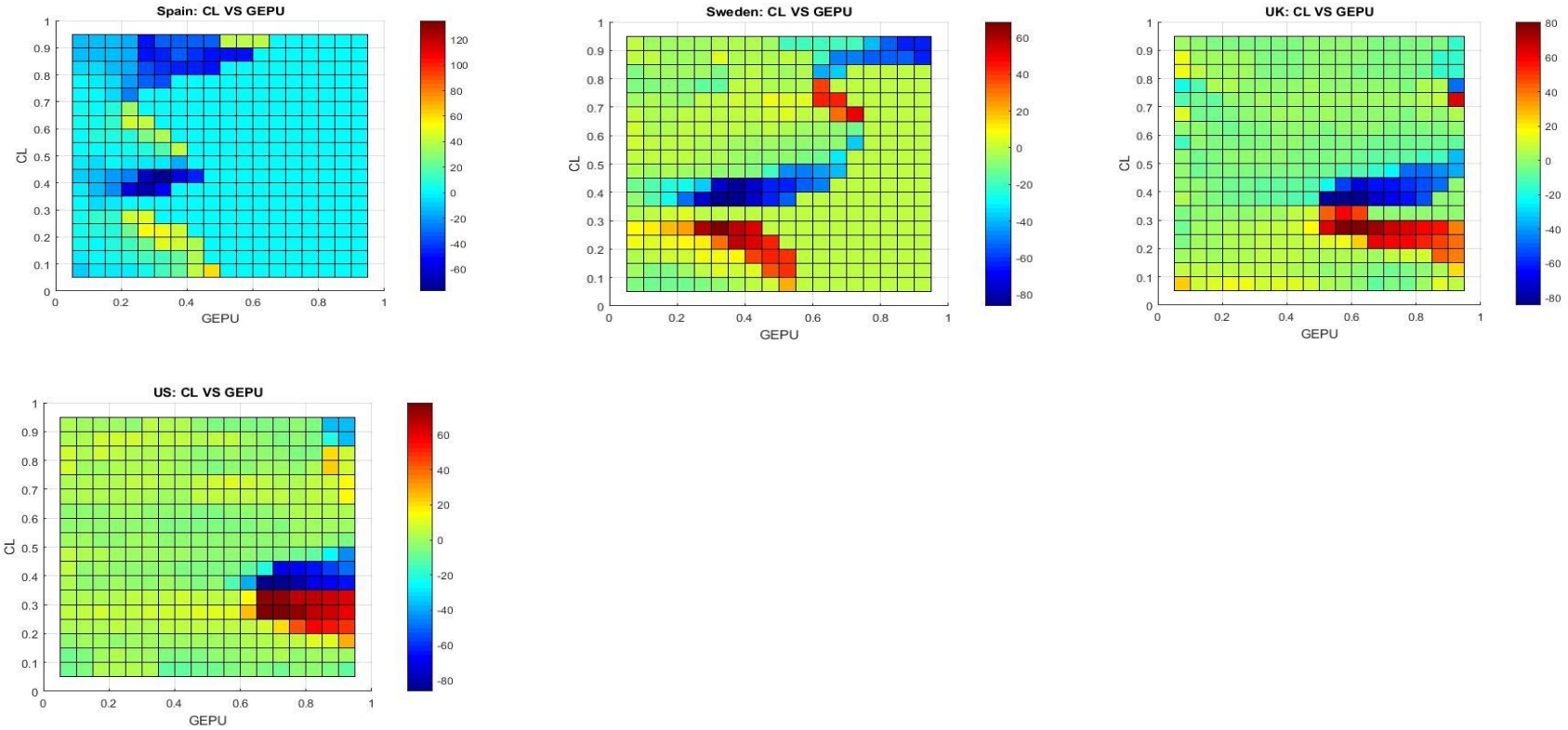




Notes: *Figure 4.1* is a two-dimensional estimation showing a pairwise dependence between local EPU (LEPU) and cross-listing (CL) for each sample country. Warmer (red) spots show the highest positive dependence, while colder (blue) spots show the highest negative dependence between local EPU and cross-listing (CL) for each sample country. The x-axis shows the quantiles of local EPU (LEPU) while the y-axis shows the quantiles of cross-listing (CL)

Figure 4.2: Quantile on Quantile Estimation for Global EPU and Cross-Listing





Notes: Figure 4.2 is a two-dimensional estimation showing a pairwise dependence between global EPU (GEPU) and cross-listing (CL) for each sample country. Warmer (red) spots show the highest positive dependence, while colder (blue) spots show the highest negative dependence between global EPU and cross-listing (CL) for each sample country. The x-axis shows the quantiles of global EPU (GEPU) while the y-axis shows the quantiles of cross-listing (CL)

4.4.4 Wavelet Coherence

We further test the relationship between local EPU and cross-listing and global EPU and cross-listing using a wavelet coherence approach. Unlike the QQR approach, which only shows the relationship at only different frequencies, the wavelet coherence breaks down the sample into periods and frequencies. It detects periods where two-time series of interest co-move. As a result, the wavelet coherence approach shows the nature of co-movement between two-time series over a specified time and at different frequencies. Thus, we measure the co-movement between two sets of paired variables, which is similar to the squared correlation coefficient in linear regression. We first measure the correlation between local EPU and cross-listing and then global EPU and cross-listing. This tells us how these two sets of paired time-series co-move in time-frequency space and produces a wavelet coherence coefficient between 0 and 1. Values closer to 1 suggest a stronger relationship, while values closer to 0 reflect a minimal connection.

Following Rua and Nunes (2009) and Torrence and Compo (1998), the wavelet is expressed as:

$$\psi_{u,s}(t) = \frac{\psi(\frac{t-u}{s})}{\sqrt{s}} \quad (1)$$

where scale s and location u are at time t, $\sqrt{s}$ is a normalization factor that provides unit variance of the wavelet. Scales and frequencies on a wavelet have a negative relationship, implying that higher ranges denote lower frequencies. This is given with the notion that a wavelet has a mean of zero and is generally normalized in a way that $\int -\infty + \infty \psi(t)dt = 0$ and $\int -\infty + \infty \psi 2(t)dt = 1$. To explain the wavelet coherence methodology, we begin by introducing the cross-wavelet transform, following Cai Tian, Yuan, and Hamori (2017). According to Torrence and Compo (1998), cross wavelet can be expressed as:

$$W_{xy}(u,s) = W_x(u,s)W_y(u,s) \quad (2)$$

where the continuous wavelet transforms of $x(t)$ and $y(t)$ are given as $W_x(u,s)$ and $W_y(u,s)$ respectively. $W_{xy}(u,s)$ shows the periods and areas where time series, x, and y covary at each given scale.

Given this background, the wavelet coherence seeks to identify areas in a combined time and frequency spectra where both time series x and y co-move even if there is standard power of co-movement. Similar to Vacha and Barunik (2012), the squared wavelet coherence coefficient is expressed as:

$$R^2(u,s) = \frac{[S(s^{-1}W_{xy}(u,s))]^2}{S(s^{-1}[W_x(u,s)]^2)S(s^{-1}[W_y(u,s)]^2)} \quad (3)$$

where S denotes the smoothing operator given that the result of the above equation, *Equation (3)*, should be within the boundaries of zero and one, i.e. $0 \leq R^2 \leq 1$. This further indicates that values closer to one show evidence of a high correlation between x and y, while values closer to zero show low levels of correlation between x and y.

4.4.5 Wavelet Coherence Analysis

This section presents the analysis of the wavelet coherence results for the sample countries, highlighting the correlation between EPUs and cross-listing decisions. The results for all sample countries are presented in *Figures 4.3 and 4.4*. The y-axis of the graphs refers to the frequency of correlation (i.e., scale). The y-axis shows the frequency, with high frequencies showing a stronger co-movement between the two series. The x-axis, which is expressed in years, shows the period (i.e., 1990 to 2016) where the series correlate. Regions with warmer colors are closer to 1, showing a higher correlation between the series. Warmer colored areas closer to the bottom of the graph show high correlation at higher frequencies, while warmer colored areas closer to the top of the graph show high correlation at lower frequencies. Warmer colors closer to the right show a high correlation at the end of the sample period. In comparison, warmer colors that are closer to the left show a high correlation at the beginning of the sample period.

Regarding the level of significance, areas in the white contoured shape represent 5% significance (Rua and Nunes, 2009). Arrows pointing to the right indicate in-phase, left-pointing arrows indicate anti-phase, while downward-pointing indicates leading with upward showing lagging.

Figure 4.3 shows evidence of co-movement between local EPU and cross-listing. In contrast, *Figure 4.4* shows those of global EPU and cross-listing for all sample countries (Australia, Canada, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Spain, Sweden, UK, and the US). We observe evidence of the dependence of cross-listing decisions on the level of local EPU and global EPU for all countries. This dependence is found across several periods and frequencies. Specifically, we report stronger dependence during periods from 1990 to 2002 between global EPU and cross-listing. However, we generally see limited evidence of this dependence between local EPU and cross-listing from the period 1998 to 2004. This could be an indication of firms being more concerned about global economic conditions, especially because cross-listing was an

emerging concept during these periods (Domowitz *et al.* 1998). We observe a stronger positive (arrows pointing rightward) relationship between local EPU and cross-listing for smaller markets. In contrast, larger markets show little influence of local EPU in the cross-listing decisions. For example, Australia, Italy, Korea, and Spain show a strong influence of Local EPU in the mid-1990s and early 2000s at medium to high frequencies. At the same time, the US and UK exhibit limited evidence.

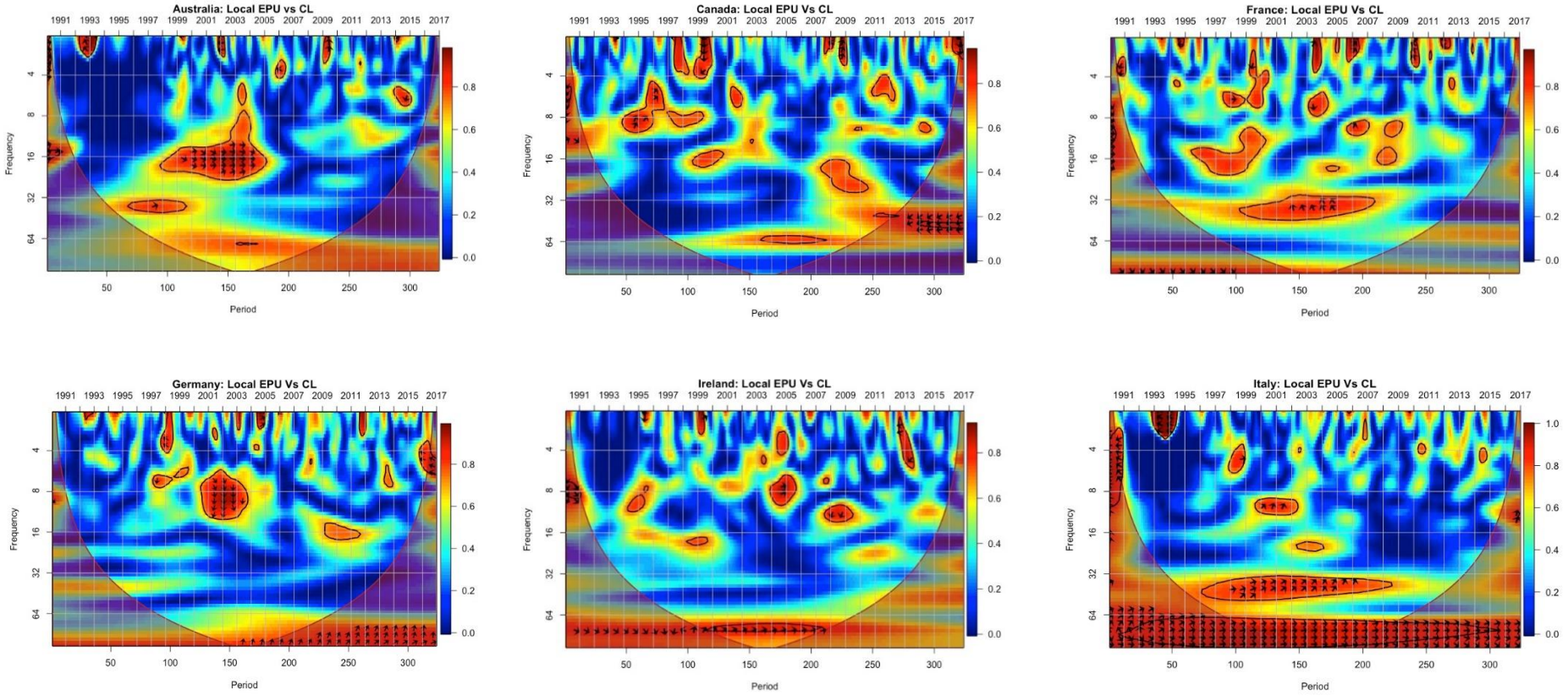
From *Figure 4.4*, we observe that relatively smaller economies in our sample, including the Netherlands, Sweden, and Korea, exhibit high negative (warmer color) co-movement between global EPU and the cross-listing decisions. This contrasts with larger economies like the United States, the United Kingdom, and Germany that show limited co-movement similar to the Granger Causality analysis. However, for Australia, we observe high positive co-movement between global EPU and cross-listing decisions during various periods with the strongest between 1996 and 2003. Generally, these results show that when firms from smaller or less developed markets are uncertain about global economic policies and conditions, they tend not to list on foreign markets. Our findings are consistent with the cross-listing literature, which shows that the developmental prospects of the host/foreign markets are vital considerations for the cross-listing decisions of firms (Hargis and Ramanlal, 1998, Korczak and Korczak 2013, and Azzimonti, 2018).

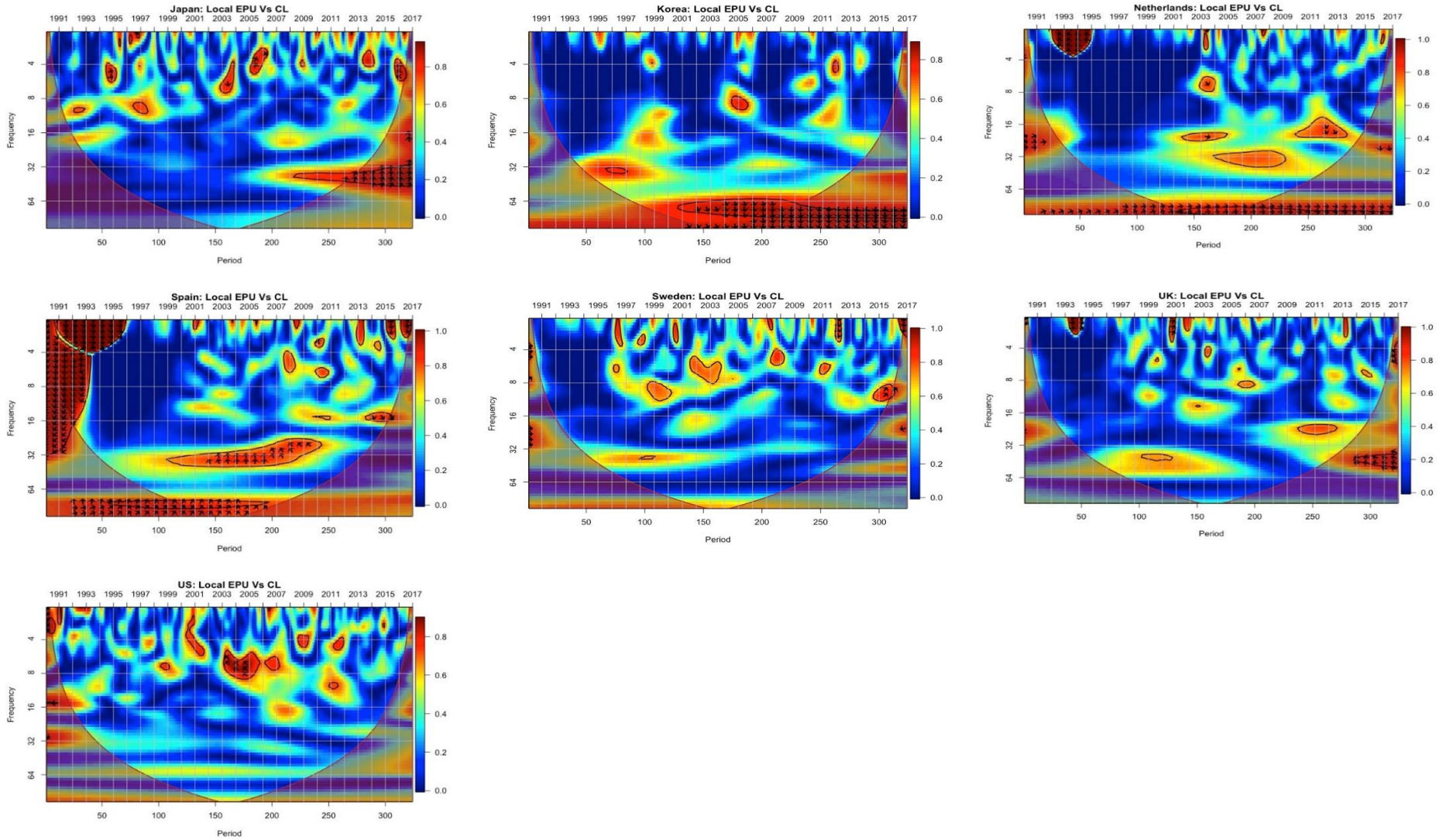
Overall, our results infer two main issues. First, uncertainty about the economic policy in the local market motivates firms to cross-list abroad. Second, uncertainty about global economic policies makes firms reluctant to cross-list abroad. Precisely, our results follow the argument that poor economic conditions in the local country encourage firms to seek international listing as a means of finding markets with more robust fundamentals, among other well-researched benefits. These findings are comparable to those from the foreign direct investment literature that shows that investors seek foreign investment opportunities in the presence of poor economic conditions in their local markets (Bevan and Estrin, 2004).

It is also interesting to again observe that countries with smaller markets tend to show more co-movement between EPU and cross-listing in general, similar to the Granger Causality and QQR analyses and those of Feldstein (1999). In his paper, he shows that smaller economies tend to be affected by global events as they are predominantly trade-reliant on bigger economies, thus, making them receivers of shocks and spillovers. Supporting this line of argument, Calvo and Reinhart (1996) indicate that smaller economies are more vulnerable to both regional and global events due to such trade connections.

From a methodological perspective, it is essential to note that our findings suggest that the wavelet coherence methodology can observe specific correlations that are not captured by the Granger Causality methodology as shown by Engle and Granger (1987), Torrence and Compo (1998), and Cai *et al.* (2017). Again, while the Quantile on Quantile is a contemporary approach and may offer important details of the aggregate dependency between the quantiles of two variables for a given period, it lacks the ability to provide such information over time.

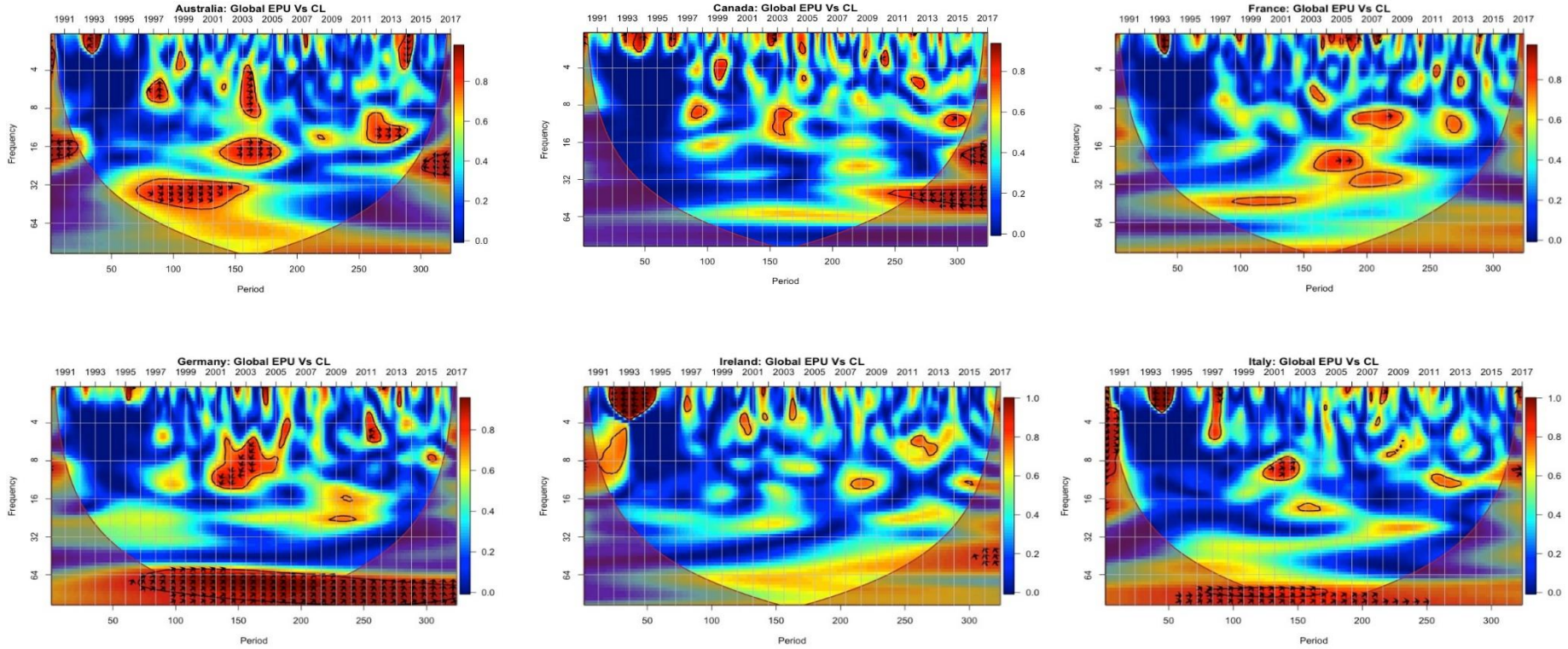
Figure 4.3: Wavelet Coherence Analysis for Local EPU versus Cross-Listing

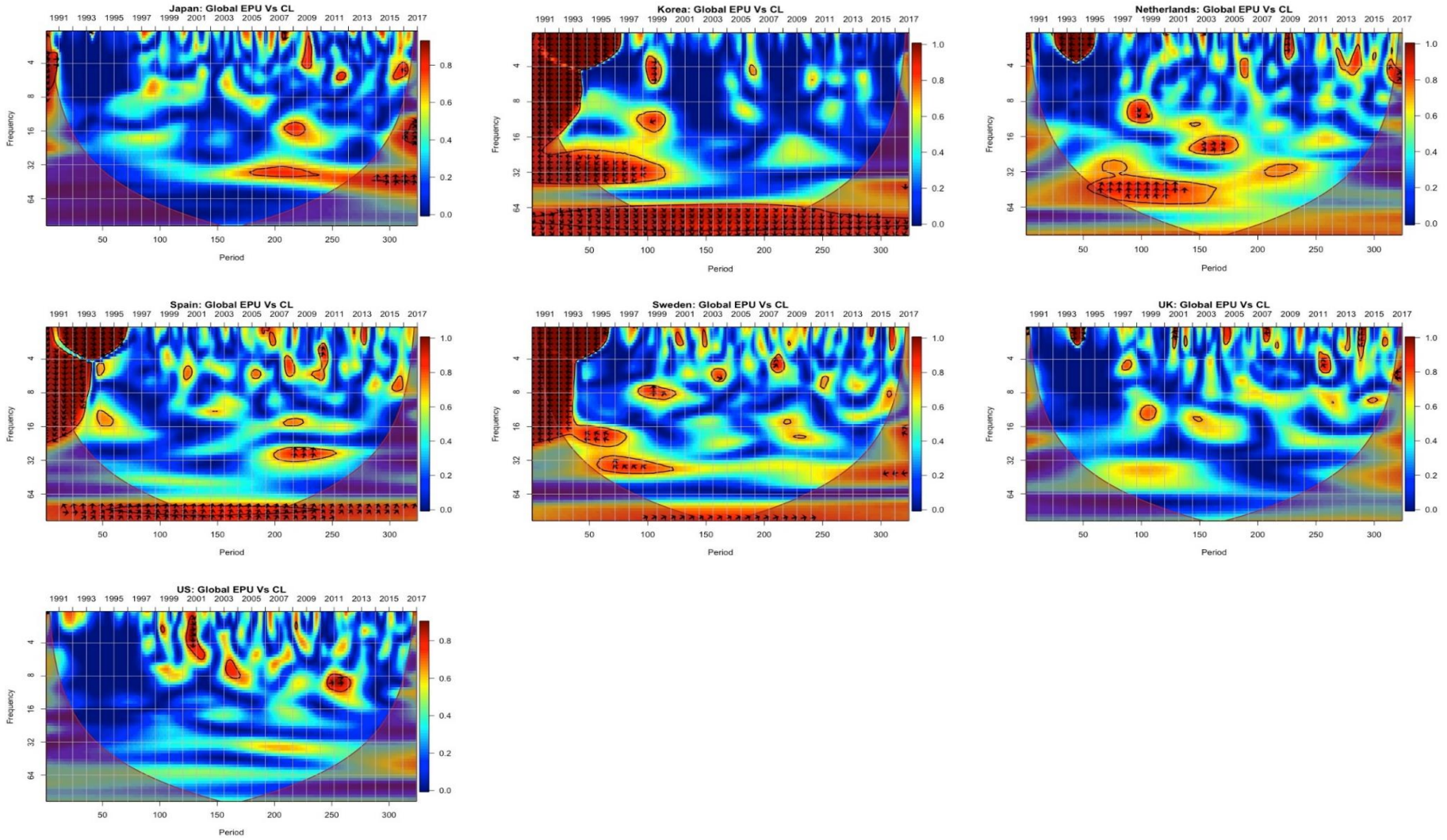




Notes: Figure 4.3 is a Wavelet coherence estimation showing a pairwise correlation between Local EPU and cross-listing (CL) sample countries. Warmer spots show high co-movement between the two variables, while colder (blue) spots show low co-movement between the pair variables. The x-axis represents years from 1990 to 2016 while the y-axis show frequency in months.

Figure 4.4: Wavelet Coherence Analysis for Global EPU versus Cross-Listing





Notes: Figure 4.4 is a Wavelet coherence estimation showing a pairwise correlation between Global EPU and cross-listing (CL) sample countries. Warmer spots show high co-movement between the two variables, while colder (blue) spots show low co-movement between the pair variables. The x-axis represents years from 1990 to 2016 while the y-axis show frequency in months.

4.5 Conclusion

The role of policy uncertainty in corporate decisions and strategies remains a growing area of research and discussion, especially in recent years. Recent studies argue that while market characteristics influence corporate decisions and strategies, policy uncertainties tend to have a similar influence (Kang *et al.* 2014, Wang *et al.* 2014, Gulen and Ion, 2015, Zhang *et al.* 2015, and Bonaime *et al.* 2018). These studies argue that market characteristics are outcomes of government policies, hence the documented impact on corporate decisions and strategies. Previous studies focus on how economic policy uncertainty in the local market impact firm spending and capital structure. The current study contributes to the ongoing discussions. Still, it differentiates itself from previous studies by investigating how and to what extent economic policy uncertainty (EPU) at both the local and global markets influence the cross-listing decisions. To this end, we collect firm and country-level data for 13 countries selected purely based on the availability of the economic policy uncertainty data and the market value of shares cross-listed from the year 1990 to 2016.

We follow the existing literature and recent discussions and make some significant propositions that serve as the premise of our examination. First, periods of high local EPU may discourage firms from borrowing from lenders as lenders are likely to increase the risk premium and demand higher interests. This is due to the increased risk of default increases during periods of higher local EPU. Second, high local EPU may also lead to firms reducing their investment expenditure. Such a reduction in investment might reduce the need to raise foreign capital through cross-listing. Consequently, periods of high local EPU is likely to either encourage cross-listing due to the higher cost of funding in the local market or reduce cross-listing activities due to the reduced need for foreign capital. This study addresses these issues and contributes to the ongoing discussions by examining how EPU influences the decision to cross-list.

The empirical examination begins with a Granger Causality methodology, which is aimed at testing the causality between EPUs and the cross-listing decisions of firms. While the results from the Granger Causality test are not strong enough, they hint that local and global Economic Policy Uncertainties are essential in the cross-listing decisions of firms. Given this weakness, we implement two contemporary approaches; Quantile on Quantile Regression and Wavelet Coherence approaches. The Quantile on Quantile Regression approach provides an examination of the relationship between the quantiles of both local and global EPUs and the quantiles of the cross-listing decisions of firms. The Wavelet Coherence approach provides an arguably complete picture of this relationship by showing how local and global EPU influence the cross-listing decisions of firms at different frequencies and different periods.

Results from the QQR approach provides important findings. We document a positive dependence between the quantiles of local EPUs of countries and the quantiles of the outbound cross-listing from those countries. The results suggest that periods of high economic uncertainty encourages foreign listing. This finding is in line with the existing literature that argues that macroeconomic conditions play a significant role in the decision to cross-list, as firms seek foreign listing to raise foreign funds. Other findings from the QQR approach suggest that firms decide to cross-list when local EPU is at its highest whereas, low and medium local EPU do not generate significant cross-listing decisions. We also document that the most robust connection between local EPU and cross-listing is shown in weaker markets. In comparison, larger markets such as the US, UK, and Germany show a limited influence of local EPU. While market size, among other market characteristics, can be cited as a potential reason for this finding, these markets are among the first choice for cross-listing.

The findings from the Wavelet Coherence approach are indicative that uncertainty about the economic policy in the local market motivates firms to cross-list abroad. They also show that uncertainty about global economic policies makes firms reluctant to cross-list abroad. Specifically,

our results support the argument that poor economic conditions in the local country encourage firms to seek international listing as a means of finding markets with better fundaments, among other well-researched benefits. These findings are comparable to those from the foreign direct investment literature that shows that investors seek foreign investment opportunities in the presence of poor economic conditions in their local markets.

Together, both the results from the QQR and Wavelet Coherence approaches reveal that local EPU is positively associated with cross-listing decisions. In contrast, global EPU is negatively associated with cross-listing decisions. Our results further propose that the size/characteristics of the local market mitigate this association. We document that smaller markets exhibit more impact from Local EPU using the Granger Causality estimation. Although the results from the Quantile on Quantile Regression and the Wavelet Coherence approaches are generally similar to those of the Granger Causality, we find that the Granger Causality estimation does not capture some co-movements.

These results provide two important policy implications for policymakers. First, though policy uncertainty cannot be entirely avoided, policymakers could create and maintain policy transparency as they have consequences on corporate decisions. Second, the results of this study emphasize the relevance of economic policies in the local market in attracting/repelling foreign investments either through cross-listing or other forms of investment.

CHAPTER FIVE

Conclusion

This chapter concludes the thesis and provides two critical summaries. First, it provides an overview of the essays presented in this thesis. It highlights the main contributions of each paper and draws on them to show the policy implications. Second, it outlines potential future research concepts based on some identified limitations of the current thesis.

Cross-listing has gained importance in corporate decisions with significant reported outcomes. Several studies discuss these outcomes and highlight that market characteristics in both the local and host markets play a vital role in the generation of these outcomes. An extensive literature also shows that peculiar market characteristics in the local and host markets motivate the decision to cross-list. However, existing studies provide little consensus on two critical issues. First, how dynamics in market characteristics influence cross-listing decisions? Second, how the reported outcomes impact other corporate decisions? This thesis presents three essays that investigate these issues.

The first essay discusses the second issue and is underpinned by the existing literature on the determinants of dividend smoothing that argue that transparency influence dividend smoothing. As foreign firms cross-list in the US, a well-established corporate outcome is an improvement in disclosure and transparency due to the disclosure and reporting requirements in the US. Consistent with the bonding hypothesis, another significant result is the signaling of a commitment to full disclosure and transparency. Therefore, the first essay investigates how commitment to full disclosure and improved transparency due to cross-listing influence the dividend smoothing strategies of firms. We begin by adopting Lintner's partial adjustment model to estimate the speed of adjustment (SOA), which measures the change in dividends as a result of a change in earnings. The SOA is inversely related to dividend smoothing. We find that firms increase dividend

smoothing by 9.47% after cross-listing. Given the considerable documented variation in dividend smoothing practices across different sectors and markets, we categorize our sample by industry and economic development of the local market. The findings show an average increase of 7.93% in all sectors except for the Agriculture, Electricity, and Administrative industries, which show an average decrease of 7.06%. We also report a higher increase of 10.27% in dividend smoothing for firms from developed markets compared to the 7.93% increase for firms from developing markets. This finding follows the market sophistication argument, which suggests that investors in developing economies are generally dividend driven compared to investors in developed economies, who are usually more sophisticated in their investments due to differences in market liquidity and transaction costs.

Next, we adopt a variance decomposition approach to investigate how cross-listing in the US influences the dividend smoothing channels. Unlike Lintner's partial adjustment model, we examine the smoothing channels for the full sample period, before and after cross-listing using the variance decomposition approach. We document a 6% and a 4% increase in the use of investments and debt channels, respectively. This finding adds to the literature that postulates that debt and investment are primary channels of dividend smoothing. Following our initial analysis and existing research, we examine variations in dividend smoothing channels at the market level.

Novel to the cross-listing literature, we report that firms from developed economies increase the use of investment channels by 13% and reduce the use of investment channels by 8%. The unsmoothed shocks to net income decrease by 4%. In comparison, firms from developing economies increase the use of investment channels by 23% and reduce the use of debt channels by 12%. The unsmoothed shock to net income decreased by 11% after cross-listing.

The examination in the first essay makes essential contributions to the literature. First, the paper provides the first insight into how commitment to full disclosure and improved transparency due to cross-listing affect dividend smoothing strategies. Second, it shows how local market

development mitigates or fosters dividend smoothing intensity. This contribution further adds to the existing literature on the relationship between investor sophistication and corporate decisions. Third, unlike previous studies that focus on dividend smoothing channels for different industries, the study offers new evidence on dividend smoothing channels and their dynamics at both the market development and industry fronts. Fourth, the current study provides new empirical evidence that shows the link between payout strategies and other financing decisions. The finding suggests that corporate financing decisions are not independent but interlinked with other corporate decisions. The essay provides relevant implications by showing how the dividend policy of a firm may change in response to the commitment to full disclosure due to cross-listing and its potential impact on dividend-driven investors. By showing the link between dividend smoothing and other financing decisions, the study suggests that higher dividend payouts could deprive corporations of either growth opportunities or lead to an increase in debt ratios.

The second essay builds on existing discussions on the role of market characteristics in the cross-listing decision. It examines how specialization in output in the local and host markets influence bilateral cross-listing decisions. The essay adopts the gravity model, which suggests that economic size and distance determine the choice of trade partners. By utilizing the gravity model, we are able to investigate the role specialization in output play in the cross-listing decisions under the gravity model conditions. Before undertaking the analysis, we create a measure of the share of cross-listing from one industry in the local market to the same industry in the host market to ascertain the bilateral cross-listing values. The essay proceeds by providing a firm level and industry level analysis.

Results from the firm-level analysis show that specialization in the output of the local market encourages cross-listing. This finding suggests that the desire to diversify funding sources and the unwillingness of managers to compete in the domestic markets for funds motivate cross-listing decisions. The results are also supportive of studies that show that competition in the local market

drives firms to seek new markets. We document that firms from local markets that are specialized in the output of specific industries pursue cross-listing in host markets that are less specialized in the given industry. We also report that firms seek cross-listing in markets that are geographically further away from their local market. The findings contradict the advertising effect and the proximity preference assertions proposed by previous studies.

Next, we examine this relationship at the industry level, given the well-documented variation in the choice of host markets for different industries. Similar to those at the firm-level, the empirical results show that specialization in output in the local market foster cross-listing. Again, we report a preference for host markets that are less specialized and further away from the local market, further indicating the weakening of the proximity bias. We then implement a Generalized Method of Moment (GMM) approach to assess the robustness of the results and report similar results as those from the initial analysis.

The investigations in essay two contribute to the literature and provide policy implications. The essay offers the first international examination of how specialization in output influences the cross-listing decision at both the firm and industry levels. The findings provide new evidence for the weakening of the gravity model conditions in line with recent studies. The results also suggest that while specialization in output may be a country-specific characteristic, cross-listing might present a spillover channel into other countries that are not specialized in that industry. Again, the results offer new supporting evidence to the literature on the relevance of market characteristics in the cross-listing decision.

The third essay follows from essay two and investigates how policy uncertainty influences cross-listing decisions. The investigation is motivated by the extensive literature that proposes that policy uncertainty impacts corporate decisions similar to market characteristics. A vital element of this proposition is that market characteristics are founded on government policies. Given this

background, the third essay examines how economic policy uncertainty (EPU) in both the local and global markets influence the cross-listing decisions of firms.

The analysis presented in the third essay begins by finding a suitable measure of economic policy uncertainty. We resort to the monthly EPU index introduced by Baker *et al.* (2016), which is a weighted average frequency count of news articles that contain words that suggest policy uncertainty about a country for each month. Higher EPU values generally indicate higher economic uncertainty, while lower EPU values suggest lower economic uncertainty for a given month for each sample country. Next, we adopt a Granger Causality approach, which enables us to test the causality between the two variables. While results from this examination exhibit the existence of causality, the results are weak. To address this, we adopt a Quantile on Quantile Regression (QQR) approach and a Wavelet Coherence (WC) approach that allows us to assess the relationship between EPU and cross-listing.

Results from the QQR approach show a positive dependence between the quantiles of local EPUs and the quantiles of the outbound cross-listing. The results suggest that periods of high economic uncertainty encourage foreign listing. This finding is in line with the existing literature that argues that macroeconomic conditions play a significant role in the decision to cross-list. This literature indicates that firms seek foreign listing to raise foreign funds and benefits from other positive market outcomes. Other findings from the QQR approach suggest that firms decide to cross-list when local EPU is at its highest whereas, low and medium local EPU do not generate significant cross-listing decisions. We also document that the most substantial connection between local EPU and cross-listing is shown in weaker markets. In contrast, more advanced equity markets show a limited local EPU influence.

The findings from the Wavelet Coherence approach are indicative that uncertainty about the economic policy in the local market motivates firms to cross-list abroad. Secondly, uncertainty about global economic policies makes firms reluctant to cross-list abroad. Our results support the

argument that poor economic conditions in the local country encourage firms to seek international listing as a means of finding markets with more robust fundamentals, among other well-researched benefits. These findings are comparable to those from the foreign direct investment literature that shows that investors seek foreign investment opportunities in the presence of poor economic conditions in their local markets.

Overall, the empirical results reveal that while local EPU is positively associated with cross-listing decisions, global EPU is negatively associated with cross-listing decisions. This finding complements the existing literature that proposes that cross-listing is motivated by the poor economic performance of the local market. However, it also suggests that policy uncertainty can decrease managers' confidence in future economic prospects, resulting in more cross-listing. While this suggestion is valid for much of our analysis, we also document that the economic development of the local market mitigates the impact of EPU on cross-listing decisions. The results from the QQR approach produces similar results to the wavelet coherence approach but shows that the association between EPU and cross-listing is uneven across different quantiles of the variables. We report that the wavelet coherence approach provides a more detailed picture of this relationship by offering both a frequency and time-varying perspective.

The results from the third easy offer important contributions to the existing literature. They provide new evidence on the influence of economic policy uncertainty on corporate decisions. However, unlike previous studies that provide single country analysis, it provides an international perspective to the discussion, while adopting contemporary approaches. The findings suggest that the relationship between policy uncertainty and firm decisions is dynamic across different countries, time, and frequencies. The essay also highlights the relevance of market development in mitigating policy uncertainty shocks. The empirical results suggest that though policy uncertainty may be inevitable, transparency about such policies could be of importance to corporate decisions.

Together, the three essays presented in this thesis offer essential contributions to the literature on the determinants of cross-listing, internationalization, and corporate finance decisions. The evidence presented in all three studies highlight the relevance of market characteristics in mitigating or encouraging corporate decisions and strategies.

5.1 Future Research Areas

The execution and findings of the essays presented in this thesis suffer limitations and indicate room future research on the subject.

The findings in essay one indicate that cross-listing in the US encourages dividend smoothing as firms commit to full disclosure and become more transparent due to the disclosure and reporting standards in the US. Recent discussions show that the disclosure requirements vary among the different levels of American Depository Receipts (ADRs). For example, cross-listing under ADR I will require minimum disclosure compared to ADR II and ADR III, which requires comprehensive disclosure. Given this difference, the evidence for dividend smoothing strategies may not be similar across all ADR levels. It will be useful to examine how different levels of ADR programs influence payout strategies. Again, while the current study considers periodic shocks to net income and corporate smoothing strategies, it would be interesting to ascertain how a permanent shock to net income will influence the dividend smoothing strategies of cross-listed firms. The current study provides evidence of a change in the speed of adjustment after cross-listing, however, given the unique dynamics during the GFC period, it could be remarkable to isolate specific periods to examine the impact of the global financial crisis on the evidence.

The second essay shows that specialization in output influences bilateral cross-listing decisions. Future studies comprising of a larger sample of developing and developed economies

could be useful. Also, a sub-sample analysis of developing and developed economies separately could be interesting, given the established difference in market development between developing and developed markets. Beyond cross-listing, it would be interesting to understand how the inflow of foreign firms impacts the competition for funding sources in the host market overtime. The findings in the current study suggest the weakening of the gravity model, as shown by recent studies. It could be of potential importance to understand whether firms experience similar or superior benefits by going further away from their local market.

The third essay presents significant findings that serve as a foundation for further examination. First, the essay utilizes a news-based EPU index to examine the relationship between EPU and cross-listing. It would be interesting to investigate whether other policy uncertainty indexes, including Twitter Happiness Index, provide similar outcomes. Most of the economies studied in the study are developed economies. A sample that includes a larger group of developed and developing economies could prove useful to the literature. Future research that allows the study of this relationship in a methodological setup with other controls could be interesting.

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