Changes in Capital Structure of Listed Emerging Market Firms in the Aftermath of the Global Financial Crisis
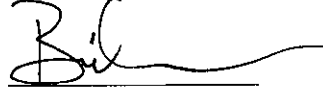
By

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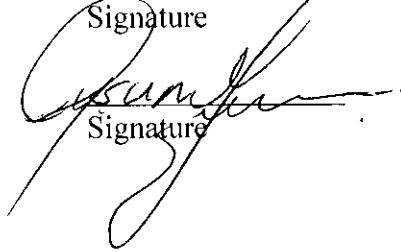Professor of International Business

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Dedication

To my parents

安丰(Feng An) and 熊英 (Ying Xiong) – for all their love and support and putting me through the best education possible. I appreciate their sacrifices and I would not have been able to get to this stage without them.

To my lovely wife

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To my little princess

安若萱 (Ava An) – this is for you.

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Abstract:

The 2007 – 2008 global financial crisis led to one of the worst recessions in history and created enormous adverse impacts on global demand, equity and debt markets around the world. Globalization increases competition for emerging-market (EM) firms both inside and outside their domestic market. One of the key challenges that they have is how to finance their growth opportunities, especially under these adverse circumstances. The impacts on most developed-country (DC) firms were devastating while EM companies experienced different levels of effects due to the aftermath of the crisis. In this study, I explore how patterns of EM firms' corporate financing decisions have changed in the aftermath of the global financial crisis. Using data from 10,860 listed firms from 22 emerging markets, which were classified by MSCI between 2000 and 2014, results show that EM listed firms with more growth options, have less profitability, larger size, more tangible assets, higher business risk, higher tax payments, higher degree of internationalization, can carry more debt.

I then analyze the changing dynamic of EM listed firms' leverage choices; results suggest capital structure determinants have different impacts on leverage prior to, during, and after global financial crisis. There is a delayed effect of impacts of the global financial crisis on EM firms' leverage policy; creditors only took precautions on the adverse environment during the crisis period (2007 – 2009). Nevertheless, there is a changing pattern on EM firms' capital structure determinants during recent decades. In the 1990s, EM firms' debt usage decisions were dominated by institutional factors, and impacts of institutional factors on firms' debt usages gradually transfer to firm-specific factors after the 1997 Asian financial crisis. Previous studies suggested EM firms'

leverage policies can be explained by the "pecking-order theory" and the "agency theory" before the 2007 – 2008 global financial crisis (Fan et al., 2014; Fernanedes, 2011). In this paper, I found that the "pecking-order theory" maintains its effectiveness in EM firms' leverage policies, and the "trade-off theory" gradually shows its effectiveness throughout the sample period.

Unlike EM firms in the whole sample, internationalized EM firms also follow different changing patterns in leverage policy determinants during the sample period, and they experienced the impact of the global financial crisis immediately. Due to additional risk exposure of internationalization, internationalized EM firms' leverage policies show support to the "pecking-order theory," but the "trade-off theory" and the "agency theory" are also supported in sub-sample periods.

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Introduction

Emerging-market (EM) companies are becoming more important in the global marketplace. In the wake of 2007 – 2008 Global financial crisis, Foreign Direct Investment (FDI) flows into and out of developed markets significantly declined in the wake of Global Financial Crisis. Surprisingly, the impact of the financial crisis on FDI flows into and out of developing and emerging economies were not as dramatic. The 2007-2008 financial crisis and the ensuing great recession in developed economies created notable anomalies in global financial markets. A sharp decline in the growth rates in the global economy and sharp contraction in global trade suggest potentially significant changes in the financing patterns in capital structures of emerging market firms. While the great recession in the U.S. and other major industrialized economies contributed to pronounced shifts in the share of developing and emerging market economies in FDI flows, outward FDI is a byproduct of the current phase of globalization. Furthermore, U.S. Federal Reserves and other central banks initiated quantitative easing programs (QEs) starting in 2008 to promote economic growth. However, investors chased higher returns from emerging markets since emerging markets experienced higher growth during the crisis period. Consequently, the extra money supply created by QE programs simultaneously flowed to EM. During the crisis years, relative shares of developing and emerging economies in the total global FDI flows have increased. According to UNCTAD (2004, 2015), developing and transition economies' share in FDI outflows nearly quadrupled by almost inflows into developing and transition

economies increased from 39% to 59%. This period created the grounds for sustained

international expansion of emerging market firms with transformative managerial

challenges.

Table 1: Annual borrowing across non-financial sectors by regions, (forex-adjusted, $bn)
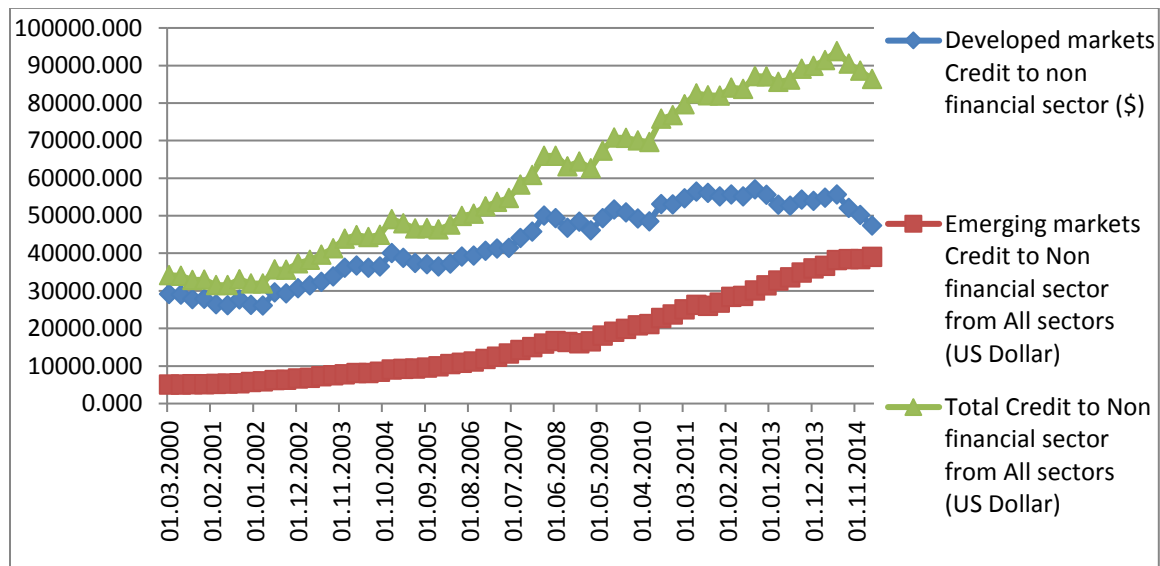
Source: BIS

According to the Bank of International Settlements (BIS) as shown in Table 1, the

borrowing across non-financial sectors in developed markets did not increase

significantly after 2007, while non-financial sector borrowing in emerging markets

surged significantly after 2009. This suggests that the money supply in the emerging

markets is more extensive than the money supply in the developed market since emerging

markets altogether showed strong growth after 2009[1]. In other words, credit

environments in emerging markets experienced different changes during the 2007 - 2008

global financial crisis. Although the aggregate credit situation and the impact of financial

crises on developed-market (DC) firms' financing patterns have been widely documented

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[1] The QE program initialited in 2011, so the increase in lending between 2009 and 2011 suggests that investors chased higher return and invest in emerging markets.

in the international finance literature, unique characteristics of the current episode presents an opportunity to explore the financial implications of a global crisis originating from core industrial economies and radiating to the periphery.

As globalization brings more competitions from developed markets and improvements on institutional environments, operations and organizational structures of EM firms become increasingly sophisticated. Thus, internal and domestic sources of fund were no longer sufficient to finance their unprecedented growth in different time periods, unconventional funding patterns have subsequently arisen. EM firms were operating in a dynamic business environment due to the 2007 – 2008 global financial crisis. The 2007 – 2008 financial crisis had distinct attributes for EM firms as compared to financial crises experienced in the 1990s and early 2000s. In other words, previous international financial literature cannot explain EM firms' leverage policies in the dynamic environment, and further investigation on EM firms' capital structure determinants in sub-sample periods will reveal changing pattern of their leverage decisions.

In additional, the global financial crisis created contraction of demand from developed markets, which reduced world trade noticeably (Calomiris et al., 2012). Although the global financial crisis impacted emerging markets at varying degrees and to a lesser extent than developed economies, it created major difficulties for EM firms regardless of the speed of the impact, especially for internationalized EM firms. This may, to a great extent, be attributed to the fact that developed markets are often the largest trading partners of emerging market economies. When internationalized EM firms slowdown their foreign sales, emerging markets have to find a way to consume these excessive supplies in their domestic market. Therefore, the global financial crisis not only

impacts internationalized EM firms immediately because of the reduction in world trade, but the crisis also impacts domestically oriented EM firms indirectly due to the excessive supply created by internationalized EM firms.

Multi-country empirical studies of capital structure commonly focused on EM firms' performances, growth, size of firms, etc., but they often ignored a distinctive features of EM firms; many of them started to internationalized from the early 2000s. EM firms operate in different countries, and they face different tax rates, institutional and financial environments as compared to their domestically oriented counterparts. Recent studies by Booth et al. (2001), De Jong et al. (2008), and Fernandes (2011) documented notable changes in the funding patterns and capital structure of emerging markets firms, however none of these studies explored the impact of the 2007 – 2008 global financial crisis and degree of internationalization (DOI) on the capital structure.

In this study, I draw on analyses offered in Booth et al. (2001), De Jong et al. (2008) and Fernandes (2011) [2] in the context of a new chapter of the global economy with an expanded data set, and explore the impact of the 2007 – 2008 global financial crisis on the determinants of capital structure by controlling for degree of internationalization (DOI). More specifically, I am exploring the following two issues: Are there any changing patterns of capital structure determinants of EM listed firms pre-, during, and post-global financial crisis[3]? Do degrees of internationalization affect EM listed firms' capital structures? To best of my knowledge, this study is the first multi-country firms'

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[2] They analyzed 10, 42 and 31 developing- and/or emerging-market firms from 1980 – 1990, 1997 – 2001 and 1990 – 2007, respectively.
[3] I divided the sample period into three sub-sample periods: prior to the crisis (2000-2006), during the crisis (2007-2009), post-crisis (2010-2014).

capital structure study that differentiates EM firms' degree of internalization during the global financial crisis.

I use the leverage ratio as a proxy for firms' leverage decisions. Leverage ratio is defined as total market value interest-bearing debt divided by the market value of the firm[4]. My sample includes all listed firms from emerging markets defined by Morgan Stanley Capital International (MSCI) for the years 2000-2014. My sample contains a total of 10,861 listed firms[5] from 22 emerging markets[6] and 9 industries[7]. Table 2 and Table 3 show numbers of EM listed firms and general statistics of leverage ratios[8] in each country and industry, respectively. Moreover, Table 2 and 3 divided the sample period into three time-frames: pre-crisis (2000-2006), during the crisis (2007-2009), post-crisis (2010-2014) periods. Descriptive statistics of EM listed firms' leverage ratios across three time-frames are displayed.

In addition, both Table 2 and 3 compare firms' pre-crisis leverage with their leverage in the post-crisis period, reporting that number of firms acquired more debt and reduced debt usage in these time periods, respectively. Table 2 and 3 also show that there

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[4] Market value of the firms is a summation of market value debt, market value of common equity and preferred stocks.

[5] Financial industry is excluded. Please see detail of my sample in the data and methodologies section.

[6] MSCI categorized 23 emerging markets. The sample does not include companies from the EAU, since Worldscope does not have data from United Arab Emirates (UAE) firms.

[7] SIC 4 digits code is used to differentiate industries. Agriculture, Forestry, & Fishing industry has SIC code between 01XX – 09XX; Mining industry has SIC code between 10XX – 14XX; Construction industry has SIC code between 15XX – 17XX; Manufacturing industry has SIC code between 20XX – 39XX; Transportation & Public Utilities has SIC code between 40XX – 49XX; Wholesale Trade industry has SIC code 50XX – 51XX; Retail industry has SIC code 52XX – 59XX; Services industry has SIC code between 70XX – 89XX; Public Administration industry has SIC code between 91XX – 98XX.

[8] Only mean is used for comparison. Median shows similar results.

are similar numbers of EM listed firms decided to reduce debt usage and decided to

increase debt usage over the sample period[9]. This finding suggests that the credit

situations of EM listed firms are different than the aggregate credit environments

described by Table 1.

Table 2: Descriptive Statistics of EM Firms Leverage by Countries

Row Labels	Count of Company	Average of Pre-crisis	Average of During-Crisis	Average of Post Crisis	Numbers of firms Increased Leverage	Numbers of firms Reduced Leverage
Brazil	220	26.94	29.22	30.70	110	73
Chile	136	23.55	24.23	26.13	58	51
China	2306	28.69	25.94	23.23	662	699
Colombia	46	12.00	14.94	16.13	23	11
Czech	8	17.88	15.62	12.53	3	4
Egypt	88	23.37	17.44	17.98	23	40
Greece	200	26.42	32.76	37.37	138	47
Hungary	24	15.12	20.23	18.35	13	8
India	1988	31.59	31.72	31.77	841	760
Indonesia	323	33.11	28.03	25.39	86	138
Malaysia	726	21.45	22.07	19.85	275	320
Mexico	87	22.13	24.81	27.14	43	29
Peru	91	19.91	22.21	19.82	27	48
Philippine	133	28.71	22.89	22.43	32	58
Poland	361	18.71	17.96	19.14	113	112
Qatar	3	20.85	26.87	33.01	1	0
Russia	305	24.80	27.44	29.53	152	92
South Africa	204	19.53	20.54	21.13	78	82
South Korea	1444	23.96	24.28	24.55	569	498
Taiwan	1505	22.61	21.82	21.20	508	661
Thailand	443	30.63	26.42	25.53	146	218
Turkey	220	21.08	23.79	25.10	108	67
Grand Total	**10861**	**26.21**	**25.72**	**25.01**	**4009**	**4016**

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[9] Public Administration industry is the only exception, but there are only 5 firms in this industry.

Note: For the last two columns, I compare firms' average leverage ratio between the pre-crisis period and the post-crisis period.

Table 3: Descriptive Statistics of EM Firms Leverage by Industries

Row Labels	Count of Company	Average of Pre-crisis	Average of During-Crisis	Average of Post Crisis	Number of firms Increased Leverage	Number of firms Reduced Leverage
agriculture	197	27.03	25.50	24.64	66	79
construction	812	26.11	25.24	26.64	352	299
manufacturing	6221	26.91	26.59	25.28	2258	2344
mining	284	25.71	25.21	26.00	109	110
public	5	35.27	34.08	27.03	3	0
retail	360	25.26	22.44	23.20	118	129
services	1379	21.48	20.95	20.50	452	444
transportation	840	28.17	28.28	29.24	371	297
wholesale	763	26.43	26.15	24.89	280	314
Grand Total	**10861**	**26.21**	**25.72**	**25.01**	**4009**	**4016**

Note: For the last two columns, I compare firms' average leverage ratio between the pre-crisis period and the post-crisis period.

Table 2 and 3 show firms from some industries and countries have increased their average leverage ratio in the post-crisis period[10]. Overall, throughout both time periods, 4,016 companies with complete data sets in both periods reduced their leverage ratio, while 4,009 firms increased their debt usage. However, there are some country and industry variations on EM firms' debt usage in the sample period. To better understand impacts of the global financial crisis on capital structure determinants of listed EM firms, I aim to explore whether firms' debt usage can be explained by capital structure determinants of listed EM firms.

This study has the potential to contribute to our understanding of capital structure in emerging markets in three ways. First, previous studies report an extensive list of

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[10] Construction, Mining, Transportation industries show average leverage ratio increased from pre-crisis period to post-crisis period.

determinants that influenced EM firms' capital structure. Many of the previous studies

are either cross-country comparison studies (e.g., Rajan and Zingales, 1995; Wald, 1999)

or single-country analyses (e.g., De Miguel and Pindado's, 2001; Fosberg, 2012).

However, none of them focused exclusively on EM firms' leverage pattern. It has been

argued that various theories[11] apply to firms under different situations and environments.

Myers (2003, pp. 216-217) suggested that "[t]here is no universal theory of capital

structure, and no reason to expect one. There are useful conditional theories, however …

Each factor could be dominant for some firms or in some circumstances, yet unimportant

elsewhere." Most previous literature only focused on how degree of internationalization

impact companies' capital decisions in DC; this study takes it further into the EM

context. For example, previous studies reported that DC firms with higher degree of

internationalization preferred lower leverage ratios than firms with lower degree of

internationalization (Burgman, 1996; Fatemi, 1988; Lee and Kwok, 1988), while Akhtar

(2005) reported that degree of internationalization is not an important factor in firms'

capital structure decisions. Nevertheless, internationalized firms made their leverage

decisions by judging many critical factors. To address this grave concern, the effect of

conditioning on firms should be considered. Moreover, my analyses complement the

previous cross-country studies on capital structure determinants (Booth et al., 2001; De

Jong et al., 2008; and Fernandes, 2011). In this study, I draw on analyses exclusively on

EM firms in the context of a new episode of the global economy with additional data.

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[11] Capital structure theories include the "pecking-order theory," the "agency cost theory," the "market-timing theory," and the "trade-off theory."

Alongside this, I focus on the EM firms with distinct characteristics, namely how their internationalizations affect their leverage decisions.

Secondly, Previous capital structure determinants studies mostly used OLS panel regression models, and Petersen (2009) argued that these OLS models produced biased standard errors due to time-series and cross-sectional dependence. Fernandes (2011) incorporated suggestions from Petersen (2009) and used OLS panel regression with standard errors clustering at the country level. To improve accurancy of the empirical model, I makes two improvements over the mehtodologies developed by Fernandes (2011).

1) The model developed by Fernandes (2011) did not take into account the firm effect that are present in his data[12]. The methodology that I employed not only adjusts panel regressions' standard errors both by country and time, but this study's statistical models also cluster standard errors by industry. As shown in Table 2, firms in different industries made their leverage decision differently. Petersen (2009) stated that:

'When both a firm and a time effect are present in the data, researchers can address on parametrically (e.g., by including time dummies) and then estimate standard errors clustered on the other demension. Alternatively, researcher can cluster on multiple dimensions. When there are a sufficient number of clusters in each dimension, standard errors clustered on multiple dimensions are unbiased and produce correctly sized confidence intervals whether the firm effect is permanent or temporary."

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[12] Fernandes (2011) incorporated country and time effects into his models.

2) Most capital structure literature employed panel datasets with a large numbers of firms, and cross-section heteroscedasticity commonly became an issue. Previous studies did not specify how to prevent the cross-sectional heteroskedasticity. To address this issue, I employ the GLS with a cross-section weights[13] model.

Together, these two improvements yield unbiased standard errors and improve robustness of regression models; the robustness validation is critical for the large data set.

Last but not least, I am testing whether patterns of corporate financing decisions have changed in the aftermath of the global financial crisis in this study. In term of the aftermath of the the global financial crisis during 2007 – 2008, Calomiris et al. (2012) differentiated three types of shocks caused: 1) reduction of world trade due to slowing demand; 2) contraction in credit supply that reduced firms' external financing capacity; and 3) selling pressures in equity markets. These three types of market shocks changed firms' abilities to raise funds from retained earnings, debt and equity respectively. For example, reduction in global trade will potentially impact EM firms' export and foreign sales, which have the potential to reduce profitability and retained earnings. These negative impacts would not only affect internationalized EM firms immediately, but also affect domestically oriented EM firms indirectly due to additional competitions and reductions on production. The contraction in credit supply can potentially impact firms' borrowing costs, or affect creditors to possibly tighten up requirements for loans. Selling pressures in equity markets will potentially increase stock market volatility and investors

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[13] Under this model, Eviews will automatically assign weights for each cross-section and recalculate standard-errors.

will likely to become risk-averse; thus, firms are not likely to sell their share at a fair price.

To recover from the recession caused by the global financial crisis, the post-crisis quantitative easing program (QE) was created and led by the U.S. Federal Reserves and other central banks in 2008. These funds were originally designed to stimulate developed economies' domestic recovery. However, during the process, they simultaneously leveraged multiple times their original value and invested in companies around the world (Wheatley & Kynge, 2015). Table 1 also confirms the capital flows. As a result, financing environments, especially debt and equity markets, were impacted differently throughout the globe during the crisis period.

In addition, Calomiris et al. (2012) found that emerging markets were more sensitive to the volatility of trade conditions and less susceptible to pressures in equity markets than developed markets. In other words, EM firms' performance and their internationalization should be impacted negatively due to the reduction in world trade. Table 4 shows descriptive statistics of these 10,861 EM firms' return on asset (ROA) and foreign sales to total sales[14] (FSTS) ratio in the overall sample period (2000 – 2014), prior to the crisis (2000 – 2006), during the crisis (2007 – 2009), and post-crisis (2010 – 2014) periods. Table 4 reported that EM firms' performance were not impacted negatively in the during-crisis period, but it declined in the post-crisis period when EM firms' internationalization increase significant. The latter finding is supporting Calomiris et al. (2012).

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[14] FSTS is a common measurement of degree of internationalization (DOI).

Table 4: Descriptive statistics of EM firms' ROA and FSTS ratio

ROA	Mean	Median	S.D.	Min	Max
Overall	5.595125	5.25	7.920159	-31.84	36.41
Pre-crisis	6.033707	5.6	8.027832	-31.82	36.38
During-crisis	6.037376	5.63	8.364755	-31.82	36.41
Post-crisis	5.054262	4.85	7.562166	-31.84	36.41
FSTS	Mean	Median	S.D.	Min	Max
Overall	18.04593	0	28.56291	0	100
Pre-crisis	12.99438	0	23.97351	0	100
During-crisis	13.27532	0	25.07672	0	100
Post-crisis	22.41196	3.83	31.10405	0	100

Notes: ROA is controlled at the top and bottom 1 %. FSTS is not controlled at the top and bottom 1% level, since there are pure domestic and global firms in the sample.
Source: Worldscope database (Datastream)

Together with information in Table 1, EM firms' ROA were likely to decrease in the post-crisis period due to firms' additional usage on debt. However, this idea is invalidate in Table 1, which also includes lending to non-listed firms. On the contrary, linking Table 4 with Table 2 and 3, EM firms' profitability were impacted negatively by the global financial crisis. Moreover, the reduction in world trade caused by the global financial crisis did not impact EM firms' internationalization negatively; in fact, their DOI show a noticeable increase in the post-crisis period. Thus, EM firms have to fund these foreign expansions appropriately when their abilities to generate internal funds are constrainted. In other word, EM firms' funding patterns are influenced by the global financial crisis and their globalization processes. According to Table 2 and 3, on average, EM firms reduced the usage on debt after the global financial crisis. This is inconsistent

with the aggregate credit data reported in Table 1. In other words, the impacts of the global financial crisis on EM firms' capital structure and performance are still unrevealed.

Summarily, to understand EM firms' funding pattern, it is important to explore the changing dynamics of EM firms' capital structure determinants during the financially challenging time. I will employ a statistical methodology[15] to explore changing dynamic of EM listed firms' leverage decisions. Results suggest that in general, EM listed firms with more growth options, have less profitability, larger size, more tangible assets, higher business risk, higher tax payments, and higher degree of internationalization, can carry more debt.

This study also searches for and compare confidence intervals of determinants' coefficients in various time periods. As improvements on the regression methodologies, yielding unbiased standard errors, improved accuracy in confidence intervals of determinants' coefficients are calculated. Findings suggest these capital structure determinants impact EM firms' leverage decision differently across the overall sample period (2000 – 2014), prior to the crisis (2000 – 2006), during the crisis (2007 – 2009), and post-crisis (2010 – 2014) periods. Together with previous studies (e.g., Booth et al., 2001; Fernandes, 2011) on EM firms' capital structure, there is a changing chain on EM firms' leverage policy determinants. EM firms' leverage policy were dominated by institutional factors prior to the Asian financial crisis, while influences of countries' institutional factors on firms' debt usages gradually transfer to firm-specific factors

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[15] Fernandes (2011) did not use a precise measurement to identify the changing dynamic of capital structure determinants, instead he ran annual cross-section regressions with his dataset and observed coefficients and their significant level changes overtime.

shortly 1997. Previous studies suggested EM firms' leverage policies can be mainly explained by the "pecking-order theory" before the 2007 – 2008 global financial crisis (Fan et al., 2012; Fernanedes, 2011). In this paper, I not only find that the "pecking-order theory" maintains their effectiveness in EM firms' leverage policy, but the "trade-off theory" also gradually shows their effectiveness throughout the sample period.

In addition, internationalized EM firms also shows different changing pattern in leverage policy determinants in the sample period, and they experienced the impact of the global financial crisis immediately. Due to additional risk exposure of internationalization, other than support to the "pecking-order theory" and the "agency theory," internationalized EM firms' leverage policies show partial support to the "trade-off theory" in the period between 2007 – 2014 and to the "agency theory" in the period between 2000 and 2009.

In section two, literature on determinants of capital structure decisions are explored, and hypotheses are built. In section three, the data and empirical methodologies are presented. In section four, discussions on results are reported.

Literature Review and Hypotheses

Theoretical Background of Capital Structure and its determinants

Firms' investment and funding decisions are critical to shareholder value maximization. Investment decisions have to be funded appropriately. One key deciding factors of funding decisions is the Weighted Average Cost of Capital, which is directly influenced by firm's capital mixture and cost of debt and equity. Thus, firms' ability to raise debt would significantly increase their capacity to pursue new opportunities. There are three reasons behind this: 1) Internally generated funds are not unlimited and impose a limit on investment size and timing. 2) External equity is more regulated for listed firms than private enterprises. 3) A firm's cost of debt is commonly lower than the cost of equity, and debt financing creates tax shields that benefit the firm with lower effective cost of debt, and increase its after-tax earnings. However, debt financing means that businesses are reallocating expected future cash flows in exchange for funds up front. In other words, for equity holders, debt financing will impact expected free cash flows negatively due to interest payments. Traditionally, financing growth opportunities through retained earnings are preferred over debt, and debt is preferred over equity under the "pecking-order theory." Balancing between benefits of debt such as tax-shields and financial distress costs is one of the key dynamics in the "trade-off theory." Furthermore, although not as popular as the first two theories, the "market timing theory" argues that firms should only issue debt or equity when they are overpriced.

In finance literature, the "trade-off theory" of capital structure, the "pecking-order theory", and the "market timing theory" are three crucial theoretical arguments contributing to our understanding of the capital structure puzzle. Under the "trade-off theory," achieving the optimal capital structure can help the firm maximize value while minimizing external claims for capital (Jensen and Meckling, 1976), researched balanced agency costs between creditors and shareholders, and between the deadweight costs of bankruptcy and taxes. Consequently, the trade-off between interest tax shields of debt and the cost of financial distress, and between agency cost of debt and equity help firms to determine their optimal target capital structure. The "trade-off theory" splits into two versions, the static and the dynamic trade-off theories. The former suggests firm's optimal capital structure is determined by a single period trade-off between the tax shields of debt and the deadweight costs of bankruptcy. The latter suggests a company is constantly adjusting/maintaining a level of debt to approach target capital structure (Myers, 1984). Bancel and Mittoo (2004) determined that the "trade-off theory" is more effective in explaining developed-country firms' capital structures than the "pecking-order theory". They surveyed firms from 16 European countries and found that financial flexibility is one of the primary determinants of firms' financial decisions. They also found that agency costs and asymmetric information are not as important as financial flexibility during considerations in leverage decisions in these EU countries.

Built upon the root of the "agency theory" that asymmetric information problems between managements and shareholders potentially affect firms' financing decisions, the "pecking-order theory" suggests that corporate insiders have more information than outside investors and creditors. Myers (1984) proposed that asymmetrical information

between corporate insiders and outsiders provoke a lack confidence when firms raise external funds. The "pecking-order theory" suggests a sequence of funding recommendations in the following order: 1) firms should use internally generated funds for their investment projects until they consume such resources; 2) raise debt if retained earnings are not sufficient to support their investments; 3) equity should be used as a last resort. The primary motivation for this ranking is adverse selection (Myers and Majluf, 1984), which argues that the heads of the firm know the fair market value of assets along with business growth potential. There is asymmetric information between managers and investors for valuing the firm, especially when the firm offers to sell equity. Outside investors must ask why managers and shareholders are willing to sell additional shares and guess the fair-price of the share. Managers and shareholders of an undervalued firm are not likely to raise fund from equity, and vice versa. When there is adverse selection for the valuation of a firm, the "pecking-order theory" will apply. Firms prefer to raise debt over external equity when internal financing is not feasible. However, firms need to distribute incomes to fulfill debt obligations. If there is asymmetric information about the risk of the new investments, adverse selection would still prefer external debt and firms would prefer external equity, as there is no obligation to pay dividends to shareholders. Thus, to make appropriate capital structure decisions, managers must consider asymmetric information about the firm value and/or risks and desires, in order to avoid mispricing by outside investors (Halov and Heider, 2011).

Similar to the "pecking-order theory", the "marketing timing theory" also assumes that there is information asymmetry between corporate insiders and outsider investors. However, the similarity ends there; the "marketing timing theory" takes a different

approach and implies that corporations do not have any preference for either debt or equity at any given time. The "market timing theory" argues when firms are seeking external funds, they would prefer to issue the lowest cost securities (Asquith and Mullins, 1986; Korajzyk et al., 1991; Loughran and Ritter, 1997; Baker and Wurgler, 2002; Huang and Ritter, 2009). Thus, managers would like to issue debt when investors are relatively bearish[16], and to issue equity when investors are relatively bullish[17]. As a result, the "market timing theory" suggests that firms' capital structure at any time should be a function of new investment opportunities and historical security mispricings. Baker and Wurgler (2002) and Hovakimian (2004) supported the "market timing theory" that firms tend to issue shares after the share-price increase. In other words, when firms have strong growth, their securities' market value is likely to increase; thus, they are more likely to acquire external capital in this period.

Without raising external capital, companies can only fund their growth opportunities with retained earnings, which directly relate to firms' profitability, asset utilization efficiency and tax obligation. Different capital structure theories interpret the impact on firms' performance and the use of external capital differently, and empirical research makes no agreement in term of capital structure theories. Fama and French (2002) suggested that no capital structure theory is perfect, and each one possesses shortcomings in explaining firms' financing decisions. In other words, the "trade-off theory" of capital structure cannot explain the negative correlation between profitability and leverage. The "pecking-order theory" cannot explain why small firms with relatively

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[16] Bearish debt market refers to low interest rate.
[17] Bullish equity market refers to high equity value.

low leverage and high growth opportunities tend to prefer equity finance than debt. The "market timing theory" cannot explain the substantial growth of secondary equity issuance of U.S. firms during the global financial crisis. Myers (2001, 2003) further argued that a universal theory for capital structure does not exist, and there is no reason to expect one. He also suggested that there are theories that fit various situations, and factors can be significant for some firms under some circumstances while they become irrelevant in other circumstances.

Built on capital structure theories, previous literature found that firms' ability to raise funds is influenced by their capital structure and other factors, such as firms' profitability (Fernandes, 2011; Fosberg, 2012; Harrison and Widijaja, 2014; Myers and Majluf, 1984; Rajan and Zingales, 1995; Titman and Wessels, 1988), growth opportunity (Akdal, 2010; Lemmon and Zender, 2010), asset tangibility (Allayannis et al., 2003; Graham, 2000; Harrison and Widijaja, 2014), size (Allayannis et al., 2003; Fernandes, 2011; Fan et al., 2012), tax (Booth et al., 2001l; De Jong et al., 2008; Fernandes, 2011; Fan et al., 2012) and business risk (Rajan and Zingales, 1995; Wald, 1999; Fernandes, 2011). In the extant literature, a wide variety of indicators were used to explain the determinants of capital structure. These six indicators listed above and in Table 5 are the most commonly used indicators explaining firm leverage and capital structure.

Table 5: Summary of Empirical Studies on Capital Structure Determinants

Developed Market Firms Capital structure Determinants						
	Growth	Profitability	Size	Tangibility	Tax	Business risk
Rajan and Zingales (1995)	-	-	+	+		-
Wald (1999)	+ / -	-	-			-
Frank and Goyal (2011)	-	-	+	+		
Demirguc-Kunt et al. (2015)		-				
De Miguel and Pindado (2001)	+					
Akdal (2011)	-	-	+	+		
Lemmon and Zender (2010)	+					
Titman and Wessels (1988)	-		+			-
Allayannis et al. (2003)	+	-	-	-		
Graham (2000)			+	+		
Akhtar (2005)		-	-	+		
Harrison and Widijaja (2014)	-	-		+		
Developed- and/or Developing- and EM firms Capital structure Determinants						
Booth et al. (2001)	-	-		+	-	
De Jong et al. (2008)	-	-	+	+	+/-	
Fan et al. (2012)	-	-	+	+	-	
Fernandes (2011)	-	-	+	+	-	

Table 5 shows how different DC firms made their capital structure based on

different determinants over different time periods. Studies[18] on developing- and EM firms

show consistent results on capital structure determinants. According to Table 5, earlier

research on the capital structure of developed market firms produced mixed support for

different theories due to several business and financial factors. Although studies on

developing-country and EM firms show consistent results on capital structure

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[18] De Jong et al., (2008) includes 42 developed-, developing-, and emerging-market firms.

determinants during a period prior to the global financial crisis, none of them exclusively

focused on EM firms' leverage decisions during the global financial crisis. In addition,

some studies focused on either a single country sample (Fosberg, 2012; Harrison and

Widijaja, 2014) or mixed samples of firms from countries in different stage of

developments during the Asian financial crisis (Booth et al., 2001l; De Jong et al., 2008;

Fernandes, 2011; Fan et al., 2012).

In addition, it is commonly believed that emerging markets and developed markets

have different financial institutional and legal environments. However, Booth et al.,

(2001) suggested that both developed- and developing-market firms' leverage decisions

are influenced by similar firm-specific factors. Fernandes (2011) also found that

emerging- and developing-market firms' capital structure decision are made similarly as

DC firms' after 2000. In other words, impacts of EM firms' leverage choices in the

period of the 2007 – 2008 global finance crisis are not studied exclusively. Therefore, it

is critical to examine EM firms' leverage decisions. The following section will address

the capital structure literature of EM firms.

EM Firms' Capital Structure Decisions

The nascent literature on EM firms' capital structure suggests that the funding

patterns and resulting capital structure of EM firms exhibit distinct characteristics

compared to DC firms. On the one hand, EM firms' funding decisions vary significantly

across markets (Booth et al., 2001), tending to rely more on internally generated funds as

compared to developed-country firms (Fernandes 2011). Moreover, most EM firms'

capital structure studies focus on either a single country or a small group of countries in a

geographical region. They provided some interest results that are completely different

than their developed market counterparts. On the other hand, a series of studies focusing on EM firms (Beck et al., 2008; Booth et al., 2001; Demirguc-Kunt and Maksimovic, 1999; Fan et al., 2012; Fernandes, 2011; Nivorozhkin, 2004) suggested that there is a positive relationship between the degree of economic and institutional development in EM and EM firms' accessibilities to external capital.

In a study focusing on Chinese-listed firms between 1995 and 2000, Chen (2004) suggested that Chinese-listed companies follow a 'new pecking-order theory' that differs from the pecking-order observed in developed markets. Chen (2004) noted that Chinese listed firms raise short-term debt after consuming internally generated funds; then they issue equity before they resort to long-term debt. Chen (2004) attributed this distinct pattern to China's unique institutional and financial characteristics. He also suggested that this is due to fundamental institutional assumptions that both the "pecking-order theory" and the "trade-off theories" are invalid in China, and institutional and banking industry in China are less developed[19] compared to developed markets. Financial constraints imposed by underdeveloped institutional and financial environments are also recorded in other capital structure literature on EM firms.

In another analysis examining capital structure of Bulgarian and Czech firms, Nivorozhkin (2004) reports that firms in transitional economies preferred short-term external financing over long-term financing due to immature institutional developments. This finding is similar to Chen (2004) in which Nivorozhkin (2004) argues that the "pecking-order theory" is more suitable to transition-economy firms than other capital

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[19] For example, China's bond market did not exist until 2004

structure theories. Expanding on the Nivorozhkin (2003) study, Delcoure (2007) analyzed

listed companies from four large Central East Europe (CEE) transitional economies

(Czech Republic, Poland, Russia, and the Slovak Republic) between 1996 and 2002.

Similar to firms in developed markets, both studies found support that firm size, asset

tangibility, profitability were critical factors that affect firms' financing choices. Like

Chen (2004), Delcoure (2007) also found that CEE companies followed a 'modified

pecking-order,' incorporating retained earnings, equity, bank and possible market debt.

Managers in these EM firms prefer equity financing over debt financing because there is

no obligation to pay dividends to shareholders, and equity is a 'free' source of capital.

The main cause behind these managers' behaviors is a consequence of underdeveloped

institutional[20] and financial infrastructure[21]. Both financial and legal systems in EM have

experienced significant leaps forward in the recent decades. Capital structure studies on

emerging- and developing-market firms suggested that country characteristics influence

firms' capital structure decisions (Booth et al., 2001; De Jong et al., 2008; Fan et al.,

2012; Fernandes, 2011). This finding is also consistent with other literature (Beck et al.,

2008; Demirguc-Kunt and Maksimovic, 1999; Nivorozhkin, 2004), suggesting that there

is a positive relationship between institutional and/or capital market developments and

firms' leverage. It is thus critical to examine the impacts of these factors in EM firms'

leverage decisions.

There are also a few cross-country studies on firms' capital structure determinants,

but none of them exclusively focused on EM firms' leverage decisions. Instead, they

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[20] I.e. lack of matured banking and legal systems for shareholder protection and corporate governance
[21] I.e. immature equity and bond markets

studied developing markets and/or firms from both developed/emerging and developing countries. The bottom part of Table 5 shows the empirical summaries of multi-country firms' capital structure determinants literature. These studies also suggested that undeveloped financial and legal systems were affecting EM firms' capital structure decisions, but improvements of financial and legal systems post the Asian financial crisis started to impact their leverage choices.

Using data from 10 developing markets ranging from 1980 to 1990, Booth et al. (2001) reported that profitability and tangibility of assets matter for firms' leverage. Their findings are in-line with Rajan and Zingales (1995), which supports the predictions of the "pecking-order theory" that profitability reduces debt ratio. Moreover, Booth et al. (2001) suggested that developing-country firms' financing decisions are made in the same way as in the U.S. and the EU, although country-characteristics dominate developing-country firms' financing choices, such as GDP growth and capital market development. De Jong et al. (2008) studied firms from 42 developed and developing countries during the Asian financial crisis between 1997 and 2001. Their findings indicate that firm characteristics are important for firms' financing decisions while these factors vary across countries. A cross-section data set of 47 developed- and developing-country firms' capital structure and their debt maturity choices between 1991 and 2000, Fan et al., (2012) found that firms from countries with less developed institutions have significantly higher leverage and show preference toward short-term financing. They confirmed that corporate financing decisions were influenced by a degree of development in financial markets (banking sector, equity and bond markets). Using a sample of almost 10,000 companies from more than 30 emerging markets between 1990 and 2007, Fernandes (2011)

complemented Booth et al. (2001). He provided evidence that EM firms' leverage is negatively correlated with profitability and tax rate, which lends partial support to both trade-off and pecking-order theories. His findings also indicate that there are significant differences in the financing patterns during the period preceding the Asian Crisis and its aftermath.

More importantly, Fernandes (2011) reported that EM firms' capital structure decisions were mainly influenced by country-specific factors prior to the Asian financial crisis. Firm-specific factors started to dominate the country-specific factors after the Asian financial crisis. His work clearly indicates that there was a changing financing pattern for EM firms following variations in institutional environments, and also indicates that capital markets were caused by the Asian financial crisis. Fernandes (2011) suggested that country-specific factors are no longer influential in EM firms' debt usage decisions at the end of his sample period[22]. Therefore, it is thus critical to explore impacts of institutional determinants in the financial sectors on EM firms' debt usage decisions in the post Asian financial crisis period; the global financial crisis created significant impact on debt and equity markets across the global in different magnitudes. The impacts and aftermath of the 2007 – 2009 global financial crisis on EM companies' capital structures are rarely studied. In the following sections, I review literature to emphasize the impact of the global financial crisis on firms' capital structure decisions.

Impact of Global Financial Crisis

The 2007 – 2008 global financial crisis originated in the U.S., and quickly spread to Europe (European debt crisis) and other parts of the world (Aubuchon and Wheelock,

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[22] Fernandes (2011) studied firms from 30 countries between 1990 and 2007.

2009). The crisis led to the worst recession in the U.S. and the world, starting in

December 2007 and ending in June 2009. Unlike the 1997 Asian financial crisis, mainly

impacting South East Asia, the 2007 – 2008 global financial crisis greatly disrupted the

global financial markets, creating devastating recessions primarily in advanced

industrialized economies (mainly developed markets first, spreading throughout the

world). The crisis first started from the U.S. real estate and mortgage segments and

quickly distorted global money and equity markets. Since the U.S. has the largest

consumption based economy and largest bond and stock markets, the rest of the world

was impacted when the U.S. entered a prolonged recession. The U.S. sub-prime crisis

quickly spread throughout the world, resulting in recessions in influential economies of

the European Union and Japan, beginning in mid-2008. Moreover, spreading through

both financial and money markets (Cetorrelli and Goldberg, 2011), cross-border banks

(Cetorrelli and Goldberg, 2011), international trade (Ahn et al., 2011), and confidence

effects, the U.S. recession not only significantly impacted many economic sectors in

developed economies, namely the on-going banking and sovereign crises in EU from

2009 (Chudik and Fratzscher, 2012), but it also spread its effects into many emerging and

developing markets (Calomiris et al., 2012; Imbs, 2010). However, the speed and

magnitude of contagion in developed and emerging markets differed substantially,

whereas for some emerging and developing markets, recession came immediately, such

as in Armenia, Mexico, South Africa, Turkey, the Baltic States and the Ukraine (Verick

and Islam, 2010).

To boost the domestic economy from the recession caused by the global financial

crisis, U.S. Federal Reserves, and other central banks jointly created the post-crisis

quantitative easing programs (QEs) shortly after the crisis began. Developed country

central banks used money issued through the QEs to buy back their government bonds,

which drove down Treasury yields, leading to a reduction in the borrowing costs in

developed markets. However, DC investors sold government bonds in the processes did

not reinvest in DC securities. Most developed markets were in a deep recession, and

return on investment was relatively lower than returns in emerging markets[23]. Thus,

investors chased high yields and invested in emerging markets. When these funds

reached to emerging markets, it created appreciation pressures for local currencies. The

appreciation of local currencies reduced the export competitiveness of EM economies.

Thus, on the one hand, EM local central banks acquired these incoming dollars, pounds,

euros, or yens and increased their assets to maintain the competitiveness of their

productions. On the other hand, local central banks also created additional money supply

and flushed them into local banks, increasing their lending abilities. Comparing the

amount that DC investors invested in emerging markets, EM local banks could lend

multiples[24] of the amounts due to local QE from their central bank. As a result, EM firms

issued foreign currency bonds[25] to take advantage of carry trade (Bruno & Shin, 2015). In

conclusion, new channels of borrowing and access to external funds existed during the

post-crisis period, not seen in to the pre-crisis period. According to the Bank for

International Settlements (BIS), U.S. Federal Reserves generated around $4 trillion of

quantitative easing programs (QEs) during 2009 to 2014, while credit provided outside of

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[23]Developed country central banks bought back their government bonds through the QE
programs, which drove down Treasury yields and led to a lower return on risk-free investments.
[24] For example, this multiple is four times for Brazilian domestic banks and ten times for Chilean
local banks (Wheatley & Kynge, 2015).
[25] Since Treasury yields declined due to QE programs, borrowing cost in developed markets also
declined.

the U.S. through bank loans and bonds reached an estimated 9 trillion dollars (Wheatley & Kynge, 2015).

DC firms' financing decisions during the global financial crisis are well documented. In an analysis of U.S. firms' capital structure during the 2004 – 2011 periods, Harrison and Widjaja (2014) found differences in the factors that drove U.S. firms' financing decisions before and after the global financial crisis. For the whole sample period, they reported that leverage is negatively correlated to profitability, liquidity, and market-to-book ratios, and leverage were positively correlated to firm size and asset tangibility. These findings general consistent with the results reported in the literature (Akdal, 2010; Booth et al., 2001; De Jong et al., 2008; Fernandes, 2011; Myers and Majluf, 1984; Rajan and Zingales, 1995; Titman and Wessels, 1988). However, during the global financial crisis, Harrison and Widjaja (2014) report that U.S. firms were required to have additional tangible assets and the impact of profitability and market-to-book ratios on leverage were smaller during the post-crisis than the pre-crisis period[26]. These findings indicate that firms during the crisis had weaker inherent financing abilities, and they preferred debt financing during this difficult time.

On the contrary, capital structure studies on EM firms in the global financial crisis are limited to mostly single-country analyses, and their findings are inconsistent with BIS and my sample of South African firms. For instance, on the one hand, credit to South African non-financial sectors did not reduce significantly during the global financial

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[26] Harrison and Widjaja (2014) only differentiate sample period into the pre-crisis and the post-crisis periods; thus, the interpretation of their findings should be treated with caution. Their post-crisis period (2008 – 2011) is the overlapped with both the during-crisis period (2007 – 2009) and the post-crisis period (2010 – 2014) in this paper.

crisis, and increased during the post-crisis period according to BIS (see Table 6). In fact, although there are more South African firms reported that they used less debt in the post-crisis period, the average leverage ratio of South African firms shows around 2% increase in the post-crisis period. On the other hand, De Vries (2013) reported that South African firms carry less debt after the crisis. However, since each country had unique characteristics and their exposures to the U.S. and European financial institutions and problematic assets remain different country by country Not all emerging economies experienced immediate difficulties. For example, OECD (2010) indicated that South Africa did not have any bank failures during the period of U.S. sub-prime crisis. Furthermore, the U.S. sub-prime crisis not only impacted the financial industry around the globe, but it changed the real sector of economics by reduction of consumption in major developed markets. The main effects on the real sectors are contractions in the manufacturing and international trade, leading to a reduction in economic growth, unemployment, and potential bankruptcy for some businesses, especially trade-oriented firms. Thus, EM firms faced tremendous financial pressure, regardless of their home country's situation. Due to these contrary suggestions on firms' leverage policy, it is, therefore, important to examine the changing dynamic on EM firms' leverage decisions through a cross-country analysis over time.

*Table 6: South Africa - Credit to Non-financial sector from All Sectors - Market value -
U.S. Dollar - Adjusted for breaks*
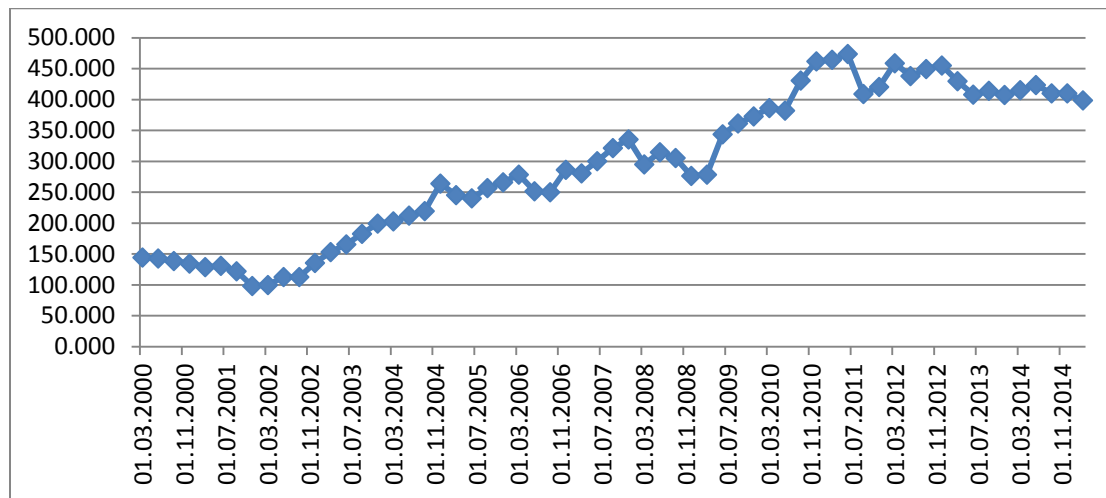
Source: BIS

Calomiris et al. (2012) compared external financial and business environments in both before and after global financial crisis. Developed and EM firms suffered different changes in external financial and business environments during the crisis period. The global financial crisis and QE programs affect both emerging markets' financial and business environments, meaning firms have to make their funding decisions in the dynamic environments. In addition, EM firms' capital structure decisions are made differently than DC firms during the pre-crisis period[27]. For example, firms' size was insignificant in the pre-crisis U.S. studies (Harrison and Widjaja, 2014), but was significant in some EM studies (Booth et al., 2001; Fernandes, 2011). In the next subsection, I will focus on how EM firms made their leverage usage decisions during the global financial crisis.

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[27] Table 5 shows empirical results on capital structure determinants.

EM firms' capital structure during crisis

Regarding EM firms during the global financial crisis, empirical analyses are very limited, and there is no multi-country analysis to my knowledge. De Vries (2013) examined a sample of 268 South African firms from 2006 to 2011. His findings indicate that the global financial crisis and recession impacted South African firms' capital structure decisions that South African firms carried less debt after the crisis due to increasing difficulties to raise debt during the recession. Unlike some multi-country analyses, De Vries (2013) found that firm size did not impact South African firms' capital decisions during the crisis, indicating that this result might be contaminated by a large number of businesses that failed during the crisis and ensuing recession. In other words, there are substantial changes in both business and financial environments in emerging markets, and firms' leverage policies have to adapt to these changing environments. Managing firms' funding strategy during and post the crisis period are entirely different than funding decision in the pre-crisis period.

Miyajima et al. (2015) suggested that EM local currency government bonds were resilient under the global financial crisis. Their findings indicate that the yields on EM local currency government debt are relatively stable but highly correlated to the yields of U.S. government bonds during the crisis period. Moreover, the yields on EM local currency government bonds were mainly affected by local short-term interest rates (before, during, and after the crisis), GDP growth (during the crisis) and fiscal balance (before and during the crisis). However, the impact on EM firms' cost of short-term borrowing on the yields of local currency bonds is gradually reduced. They also found that the changing pattern of short-term borrowing cost is likely to change during crisis and affect EM firms' capital choices. A fascinating finding suggests the yield of EM local

currency bonds can be explained by the yield of U.S. 10-year government bonds from 2008, with increasing influence over time, both in terms of significance and size of the impact. This finding is likely a result of low government yields in developed countries during the same period driven by the QE program lead by both developed markets and their local government yield. Moreover, Bekaert et al. (2014) showed that country fundamentals were re-assessed by investors based on institutional factors and banking sector depths, and these fundamentals reshaped firms' leverage policies to the crisis shock. Firms' capital structures should adjust due to the changes of country fundamentals, instead of due to country's exposure to a financial crisis. Thus, institutional factors in financial sectors could affect EM firms leverage decisions, especially during the period of global financial crisis.

Demirguc-Kunt et al. (2015) analyzed firms' capital structures based on a sample of 80 developed- and developing-country firms over the period between 2004 and 2011. They found that firms' leverage, debt maturity, and the use of long-term debt decreased, especially for businesses that preferred financing their growth through long-term debt before the 2007 – 2008 global financial crisis. The same symptom was also reported by Fernandes (2011); EM firms steadily reduced the use of long-term debt after Asian financial crisis. Demirguc-Kunt et al., (2015) found that these reductions are more pronounced for firms with higher overall debt, longer debt maturity, and more long-term debt, and for firms from countries with immature institutional environments, such as weaker property rights and more restricted and less developed banking sectors. The latter findings are consistent with previous studies that show that firms' leverage decisions are

influenced by the development of institutional environments (Demirguc-Kunt et al., 1999) and banking sectors (World Bank, 2013).

Recent capital structure literature also suggested country-characteristics influence firms' financing decisions. Oh and Rhee (2002) suggested that the development of Korea bond markets reduced the impact of the Asian financial crisis for Korean firms due to the extra channel of external funding. Bae and Goyal (2009) examined firms' financing decisions during Asian financial crisis and found that firms from countries with less developed property and creditor rights experienced reductions in loan maturities and banks demanded higher interest rates than pre-crisis period. According to Fernandes (2011), EM firms' leverage ratios increased from the 1990s and peaked during 1997-1998, then declined substantially and maintained similar or lower ratios in 2007. Due to the sharply fallen stock prices during the Asian crisis period, the trend of leverage ratios movements is more pronounced for market-value leverage ratios, and a similar pattern in book-value leverage ratios suggested that firms changed their capital structures to adjust to enormous pressures under financial distress. EM companies not only altered their capital structures during and after the Asian crisis, but they also changed their capital structure strategies due to improvements in regulatory and institutional environments. Meanwhile, EM firms made their leverage decision by gradually approaching developed market companies' strategies before the U.S. sub-prime crisis (Fernandes, 2011). Therefore, it is plausible to expect changes in financing patterns and changes in capital structure.

Throughout the financial crisis, both banks and investors would be more likely to tighten up credit and to increase requirement on loans; thus, creditors would be likely to

reduce or even to stop rolling-over both short-term and long-term debt that is about to mature. Accordingly, creditors are willing to lend money only if lenders are willing to pay a premium to compensate for additional risk and uncertainty. This situation will increase the borrowing cost associated with long-term debt, and the long-term borrowing costs are likely to exceed the cost of rolling over short-term debt. Thus, the newly issued debt during the financial crisis would be expected to have shorter maturities than debt issued during the pre-crisis period (Demirguc-Kunt et al., 2015). These arguments suggest that the degree of decline on both short- and long-term debt during the global financial crisis mainly depends on firms' initial debt maturity structure preceding the crisis. However, according to data from BIS, credit provided to emerging markets' non-financial sectors increased dramatically. Table 7[28] shows 15 EM credit provided to non-financial sectors between 2000 and 2014. During the period between 2000 and 2014, the aggregate borrowing in these 15 emerging markets increased over 700%. Even since 2008, the credit to non-financial sectors increased from $15 trillion dollars in 2008 to over $35 trillion dollars in 2014. Thus, study on EM firms' capital structure determinants during this time period would provide insights on how EM firms handle their funding strategies during challenge time.

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[28] Table 7 contains credits provided to both EM listed and privately held firms, and it should be treated with caution.

Table 7: Emerging Markets Credit to Non-Financial Sector from all sectors (U.S. Billion Dollar)
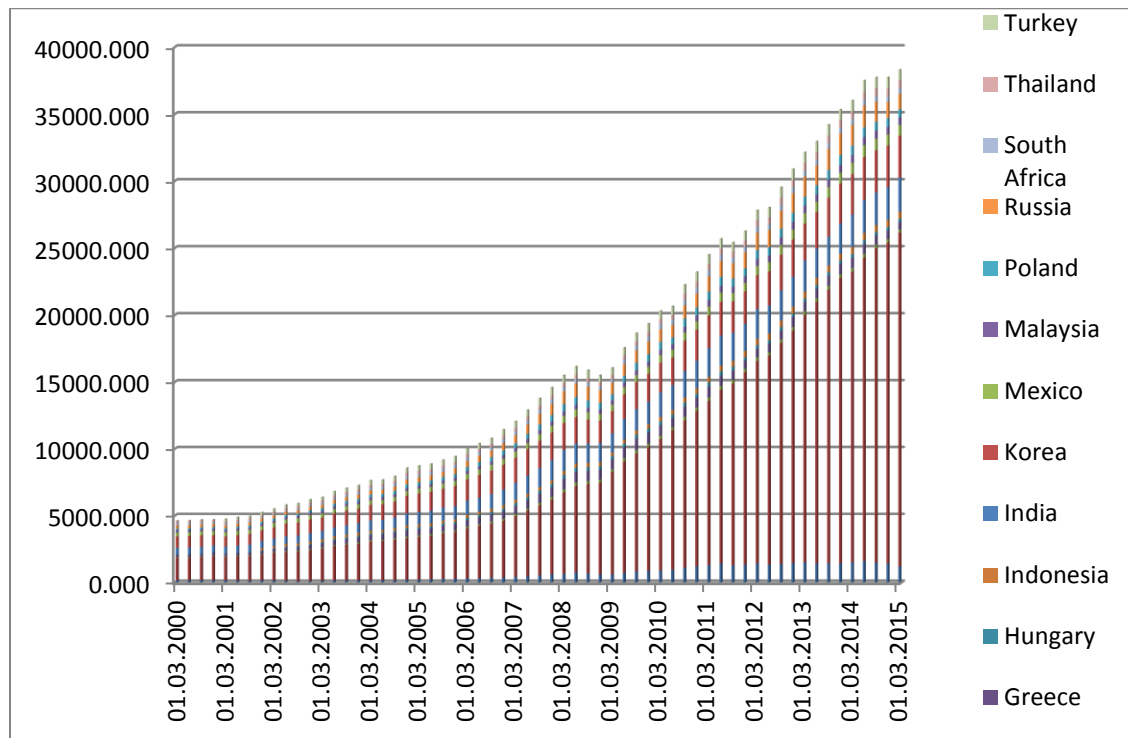
Source: BIS. This table includes 15 out of 23 emerging markets classified by MSCI. Chile, Colombia, Egypt, Peru, Philippines, Qatar, Taiwan and the United Arab Emirates are excluded since BIS does not have data for these countries.

Emerging markets experienced dramatic improvements in institutional and financial environments over the last three decades, especially after major financial crises, specifically the Asian financial crisis and the global financial crisis. Fernandes (2011) suggested that institutional developments such as improvements in legal systems and financial regulation took place in the aftermath of the Asian crisis. This muted cross-country differences in firms' leverage policies; these developments also pointed to the primacy of firm specific factors in the post Asian financial crisis period. This changing pattern indicates that financing decisions made by EM firms are slowly approaching to funding decisions made by developed market companies. Before the 2007 – 2008 global financial crisis, although country-specific factors remained influence to EM firms'

financing decisions, firm-specific factors became dominating elements in such decisions (Fernandes, 2011). However, country-specific factors did not lose their influence on EM firms' leverage decisions (Fernandes, 2011). Therefore, I will include institutional factors from both credit and equity markets and explore their impacts on EM firms' leverage decisions.

The global financial crisis impacts emerging markets' debt and equity markets, creating a changing business environments (Calomiris et al., 2012). According to table 7, 15 out of 23 emerging markets[29] experienced a significant increase in aggregate borrowing from 2000 to 2014, especially post-global financial crisis. However, aggregate data cannot be used to explain EM firms' leverage behavior during the sample period. For example, Fernandes (2011) reported that the leverage ratio of EM firms gradually reduced from 1997 to 2007, but Table 7 shows that the overall borrowing for these 15 emerging markets tripled from 2000 to 2007. Moreover, Table 2 and 3 show that the average of 10,861 EM (includes these 15 countries in Table 7) listed firms' leverage reduced over the same period[30]. Therefore, detailed analyses are demanded to understand the changing dynamic of EM listed firms' capital structure decisions, and Table 7 should be treated with caution since it included both listed and private businesses. Because of continuously economic integration and institutional improvements, EM firms became major players in not only in their home markets, but also in the global arena. It is extremely important for both managers and academia to study the changing dynamic of

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[29] MSCI classifies 23 countries as emerging markets.
[30] Table 10 does not show annual data, but it shows the average and median of firms' leverage pre, during, and post-global financial crisis.

capitals structure determinants that affect firms' leverage policies during the $2007 - 2008$ financial crises. Therefore,

$H1_0$: Capital structure determinants of EM firms have similar impacts on firms' leverage in the pre-crisis period $(2000 - 2006)$, the during-crisis period $(2007 - 2009)$ and the post-crisis period $(2010 - 2014)$.

$H1_a$: Capital structure determinants of EM firms have different impacts on firms' leverage in the pre-crisis period $(2000 - 2006)$, the during-crisis period $(2007 - 2009)$ and the post-crisis period $(2010 - 2014)$.

The extant literature on capital structure and firm leverage revealed the importance of institutional characteristics of the home market and provided evidence regarding the influence of institutional development on firm leverage. The case in point is Fernandes (2011), which explored the changed in firm leverage in the context of Asian financial crisis. Even though international finance literature covered a wide range of both macro and micro determinants of capital structure and their impact on leverage, the impact of firms' internationalization on leverage was not studied extensively. This is particularly the case in the emerging market context; thus, I will also focus on internationalized EM firms' leverage policies in the following section.

Capital Structure Decisions and Degree of Internationalization

For firms to expand their market parameters, internationalization is one of most common inevitable ways. Globalization amplified the speed that EM firms sprung into the global arena. According to Table 2, listed EM firms shows significant increase in their FS/TS ratio between 2000 and 2014. When EM firms chase expansion

opportunities, their managers are faced with a new set of financial concerns. In terms of

funding decisions, MNCs and domestically oriented firms made their decisions by

judging different factors (Akhtar, 2005). Burgman (1996) suggested that MNCs hedged

these additional risks by using their capital structure. Nevertheless, both capital structure

theories and empirical studies of capital structure did not address EM corporations with

internationalization[31].

Firms' internationalization stimulates two counter acting forces that affect firms'

leverage policies. On the one hand, as argued by Fatemi (1984), internationalization leads

to diversified cash flows and lower financial distress costs. Internationalization also

creates geographic tax shield benefits. Both factors, in the context of "trade off theory"

suggests higher debt capacity and potentially higher leverage in firms with extensive

international operations as compared to purely domestic firms (Chen et al., 1997; Doukas

& Pantzalis, 2003; Reeb et al., 1998). Moreover, imposing debt commitments for foreign

managers can help to reduce discretionary cash flows and mitigate the overinvestment

risk in unproductive projects. In other words, in the context of MNCs with substantial

informational asymmetry, debt can mitigate the agency problems.

On the other hand, while aforementioned benefits of internationalization increase

the debt capacity, there are also offsetting factors such as increased volatility of earnings.

Since firms with extensive international operations are exposed to substantial political,

economic and exchange rate risks, it is plausible to argue that their internationalization

increases financial distress costs. Two early studies conducted in the 1980s (Fatemi,

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[31] This is mainly due to that internationalization of emerging-market firms in large scale is a recent phenomenon.

1988; Lee and Kwok, 1988) indicated that MNCs preferred lower leverage ratios than domestically oriented firms. Similar argument suggesting lower debt utilization by MNCs in the context of "pecking order theory" is also focused on informational asymmetry. International expansion of firms evidently reduces the transparency, and increases perceived risk of home bound creditors and equity investors. It is argued that informational asymmetry between shareholders and managers is more pronounced in the case of MNCs than in domestic firms (Lee and Kwok, 1988; Chen et al., 1997; Mansi and Reeb 2002a; Doukas and Pantzalis, 2003). As a result, "pecking-order theory" suggests that firms that have an increasing level of internationalization should have lower debt utilization. Consequently, informational asymmetry and higher perceived risks by creditors leads to higher cost of debt and thus reduces a firm's debt capacity. While Bodnar and Weintrop (1997) provide evidence that MNCs have more growth opportunities, Myers (1977) argued that the scale of underinvestment problem is larger for multinational firms. It is well documented in the literature that firms mitigate underinvestment problems by underutilizing their debt capacity and leaving room for future debt financing. Therefore, unused debt capacity suggests lower leverage for MNCs or high growth firms internationalizing rapidly.

Another factor that potentially alter internationalized firms' leverage usage is the agency costs. Asymmetric information between corporate insider and outside investors is the core arguments in the "pecking-order theory," the "agency theory" and the "marketing timing theory". However, the similarity ends there. The "agency theory" not only emphases asymmetric information between corporate insiders and outsiders, but it also argues that there are misalignments in objectives between managers in different

levels, such as conflicts of interest. Agency costs between shareholders and managers are higher for MNCs than domestically oriented firms (Doukas and Pantzalis, 2003). Chen et al. (1997) argued that MNCs' managers are more likely to misuse funds due to the poor monitoring processes. In addition, Jensen (1986) reported that monitoring and controlling local managers are complex tasks for MNCs executives. Thus, the benefit of debt helps firms to reduce agency costs and mitigate potential possibility that foreign managers misuse free cash flows (Jensen, 1986). In this respect, firms' internationalization and debt usages should hold a positive relationship.

On the contrary, Lee and Kwok (1988) also suggested MNCs have higher agency costs and negatively influence their usage on debt. In other words, creditors are more likely to demand higher compensation for MNCs, which increase the cost of borrowing and reduce the likelihood that MNCs acquire more debt. Firms with extensive international operations tend to be more opaque as compared to domestic firms (Burgman (1996), Bartov et al., 1996). Consequently, the "agency theory" does not offer a consistent prediction for the MNCs' debt utilization and capital structure. These counteracting forces suggests that the relationship between the degree of internationalization and debt utilization is far from being straightforward and demands empirical analysis.

The literature exploring the impact of the internationalization on firm leverage is nascent and inconclusive. In an analysis of 617 U.S. firms between 1993 and 1997, Mansi and Reeb (2002) suggested that there is a non-linear positive relationship between MNCs' leverage and their level of internationalization. In an analysis of 834 U.S. listed firms from 1964 to 1983, Lee and Kwok (1988) suggested that agency costs and non-debt

tax shields were higher for MNCs than domestically oriented firms, reporting insignificant differences in bankruptcy costs. In an examination of 974 U.S. listed companies over the period of 1987 – 1991, Burgman (1996) indicates that domestically oriented firms had higher target debt ratios than MNCs' while earnings volatility was not affected by international diversification.

Kwok and Reeb (2000) argued that while upstream internationalization reduces MNCs' risk exposures, downstream internationalization increases MNCs' risk exposures[32]. This is due to different levels of maturity of institutional and business environments. Supporting their argument, Mittoo and Zhang (2008) argued that agency problems decrease when the U.S. is emerging-market multinational corporations (EMNCs) main foreign market. When EM firms and DC firms internationalized into the same host country, expansion opportunities and inherent risks are considerably different among them. In their analysis of U.S. MNCs' capital structure choices, Desai et al. (2004) emphasized an institutional environment of MNC subsidiaries and argued that underdeveloped financial markets and insufficient creditor protection have forced MNCs to resort to internal financial markets. Their analysis indirectly points to potentially lower debt utilization when firms expand into institutionally underdeveloped markets. In analysis of 31 emerging- and developing-market firms' internationalization and leverage between 1991 and 2006, Gonenc & Haan (2014) used foreign sales to total sales ratio to measure the DOI, and they found that the relationship between leverage and DOI depends on firms' growth opportunities and local financial market development. When emerging

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[32] Upstream internationalization means firms expand to markets that are more developed than their home markets, and vice versa for downstream internationalization.

economies have relatively well-developed domestic equity and credit markets, EMMCs with high growth opportunities tend to use more debt than their counterparts from developing countries. However, the impacts of DOI on EM companies' capital structures are rarely studied, and previous literature does not apply to the 2007 – 2008 global financial crisis due to the uniqueness of the EM firms and their process of globalization.

In addition, Kwok and Reeb (2000) classified EM firms and developing market firms altogether in the same category. Improvements in institutional and financial environment, forged emerging economies ahead of developing countries. While emerging markets' institutional environments progressed, EM firms' skills to exploit institutional voids became a competitive advantage in their expansion into institutionally weaker environments. Accordingly, it is fair to argue that emerging markets stand somewhere between the institutionally mature markets and institutionally weak markets with massive institutional voids. A natural expansion of this argument is the resulting risk exposure emanating from EM firms' international expansions. While their upstream internationalization into institutionally and economically advanced countries mitigated their risk exposure, their downstream forays into less developed institutional settings did not increase their risk exposure to the degree of their developed country counterparts. Consequently, it is plausible to argue that EM firms with an extensive degree of internationalization may have entirely different leverage dynamics than their developed country counterparts during the 2007 – 2008 global financial crisis. Therefore,

$H2_0$: The degree of internationalization does not impact EM listed firms' capital structure decisions during the period of 2000-2014.

$H2_a$: The degree of internationalization impacts EM listed firms' capital structure decisions during the period of 2000-2014.

Following Gonenc & Haan (2014), I will use foreign sales as total sales to measure EM firms' DOI. The following section shows the sample data and analyses methodologies.

Data and Methodology

Sample

In this analysis, I cover all listed firms from all emerging markets defined by Morgan Stanley Capital International (MSCI) for the years 2000-2014. I extract firm-level data from Worldscope database (Datastream). The sample includes only active companies. Since Worldscope does not have data from United Arab Emirates (UAE) firms, therefore this sample does not include companies from the UAE[33]. The preliminary sample contains 14,288 firms. After excluding financial firms[34] and omitting firms with missing data, all variables are controlled at the top and bottom 1%[35]. As results in Table 2 and 3, the final sample contains a total of 10,861 firms from 22 emerging markets and 9 industries. The number of businesses from each country varies significantly; with Qatar having the smallest number of companies (3), while China (2,306) and India (1,988) having the highest number of firms. Similarly, there are also significant industry variations. There is a total of 6,221 manufacturing firms, and there are only 197 agriculture and 5 public administration firms in the sample.

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[33] The Dubai financial market only contains 45 firms, which is a relatively small fraction compare to the preliminary sample of 14,288 observations.

[34] Some firms (over 2000 of them) do not have industry code from Worldscope. For such firms, industry codes are collected through Onesource.

[35] Bottom 1% of the companies based on their FSTS ratios were not excluded. The main reason is that over half firms in the sample are purely domestic oriented and reported 0% foreign sales to total sales.

To analyze capital structure decisions made by EM firms before and after the global financial crisis, I use leverage ratio as the dependent variable proxy in this study. Leverage ratio is defined as total market value financial debt divided by the market value of the firm[36]. Financial debt is the interest-bearing debt. The market value of a firm is the sum of financial debt, the market value of equity, and preferred stock. Table 2 and 3 show the descriptive statistics of EM firms' leverage ratio during the whole sample period, and three sub-sample periods. In addition, Table 2 and 3 show that numbers of EM firms decided to increase debt usages and number of EM firms decided to reduce debt usages in the post-crisis period are very similar. However, in the comparison analyses in Table 2 and 3 there is no discrimination on firms' leverage usage before the global financial crisis.

Firms with a low level of debt prior the crisis should be impacted very differently than firms with more debt in their capital structures. To explore EM firms' leverage usage changes in response to the global financial crisis, I divide the sample EM firms into three groups regarding their average leverage ratios prior the crisis: low-leverage group contains firms with less than 20% average leverage; mid-leverage group contains firms with leverage between 20% and 50%; and high-leverage group contains firms with over 50% leverage. Then I compare each firm's average leverage in the pre-crisis period (2000 – 2006) and the post-crisis period (2010 – 2014). By doing this, I can identify EM firms' leverage usage changes in reference to their prior-crisis leverage level. Similar to Table 2 and 3, I also categorize EM firms' leverage changes between the pre-crisis period and the

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[36] Market value of the firms is a summation of market value debt, market value of common equity and preferred stocks.

post-crisis period into increase and decrease sub-category in the post-crisis period.

Moreover, each sub-category splits into three sub-groups to further discriminate the

magnitude of firms' leverage changes. If their average leverage ratios in the post-crisis

period change from their average leverage ratios in the pre-crisis period with magnitude

within 20%, between 20% and 50%, and more than 50% of their average leverage ratios

in the pre-crisis period, they will be recorded in the low, mid, and high change sub-group,

respectively. Table 8, 9, and 10 show numbers of firms in different leverage categories

that experienced changes in leverage in term of percentage changes of their average

leverage ratio in the pre-crisis period.

Table 8: Numbers of EM firms with less than 20% leverage in the pre-crisis period

	Low Increase (<20% of pre-crisis leverage)	Mid Increase (20% - 50% of pre-crisis leverage)	High Increase (>50% of pre-crisis leverage)	Low decline (<-20% of pre-crisis leverage)	Mid decline (-20% - -50% of pre-crisis leverage)	High decline (>-50% of pre-crisis leverage)
agriculture	3	6	20	6	6	12
construction	8	21	149	17	15	36
manufacturing	103	170	791	110	192	299
mining	3	5	47	2	13	15
public	0	0	2	0	0	0
retail	6	10	48	7	11	22
services	24	39	240	36	48	95
transportation	12	17	135	7	17	33
wholesale	12	17	105	17	24	48
Sub Total	**171**	**285**	**1537**	**202**	**326**	**560**
Grand Total	**1993**			**1088**		

Table 9: Numbers of EM firms with leverage between 20% and 50% in the pre-crisis period

	Low Increase (<20% of pre-crisis leverage)	Mid Increase (20% - 50% of pre-crisis leverage)	High Increase (>50% of pre-crisis leverage)	Low decline (<-20% of pre-crisis leverage)	Mid decline (-20% - -50% of pre-crisis leverage)	High decline (>-50% of pre-crisis leverage)
agriculture	13	10	12	12	12	18
construction	48	59	55	59	69	60
manufacturing	396	376	323	458	537	426
mining	15	14	20	21	25	22
public	0	0	0	0	0	0
retail	19	16	15	16	24	29
services	36	47	56	58	64	93
transportation	63	57	68	65	71	51
wholesale	47	50	41	55	64	64
Sub Total	**637**	**629**	**590**	**744**	**866**	**763**
Grand Total	**1856**			**2373**		

Table 10: Numbers of EM firms with more than 50% leverage in the pre-crisis period

	Low Increase (<20% of pre-crisis leverage)	Mid Increase (20% - 50% of pre-crisis leverage)	High Increase (>50% of pre-crisis leverage)	Low decline (<-20% of pre-crisis leverage)	Mid decline (-20% - -50% of pre-crisis leverage)	High decline (>-50% of pre-crisis leverage)
agriculture	1	1	0	4	5	4
construction	6	5	0	4	17	22
manufacturing	74	24	1	95	132	92
mining	4	1	0	3	3	6
public	1	0	0	0	0	0
retail	3	1	0	3	8	9
services	7	2	1	10	15	25
transportation	13	6	0	14	24	15
wholesale	6	2	0	16	13	13
Sub Total	**115**	**42**	**2**	**149**	**217**	**186**
Grand Total	**159**			**552**		

According to Table 8, 9, and 10, EM firms with different debt usage prior to the crisis show asymmetric movements on their debt usage changes in the post-crisis period.

This finding is inconsistent with the symmetric movements shown in Table 2 and Table 3[37]. Table 8 shows that there are 3,081 firms with complete data in the sample period that reported less than 20% debt usage in the pre-crisis period. Out of these 3,081 firms, 1,993 of them reported that they used more debt in the post-crisis period and 1,088 firms reported that they used less debt in the post-crisis period. Moreover, the majority of firms in the low leverage group reported extreme changes in their debt usages in the post-crisis period. Out of 1,993 firms reported, they used more debt in the post-crisis period; 1,537 firms reported that their average leverage ratios in the pre-crisis period were over 50% higher than their average leverage ratios in the pre-crisis period[38]. On the contrary, out of 1,088 firms that reported debt reductions in the post-crisis period, 560 firms that reported such reductions are over 50% lower than their average leverage ratios in the pre-crisis period. There is no industry variation in Table 8.

Unlike Table 8 that show more EM firms increased in debt usage in the post-crisis period, Table 9 and Table 10 show that EM firms with different level of debt reported inconsistent results. According to the "pecking-order theory" and the "agency theory," if a firm's existing debt in the pre-crisis period increased, they are less likely to acquire additional debt due to asymmetric information issues. Findings from Table 9 and Table 10 support this view. Table 9 shows a very different dynamic on EM firms' debt usage in the post-crisis period. Out of 4,229 firms in the median leverage category, 2,373 of them reported that they used less debt in the post-crisis period than their debt usage in the pre-

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[37] Table 2 and 3 show that there are similar numbers of emerging-market listed firms decided to reduce debt usage and decided to increase debt usage over the sample period.

[38] I also visually check the data to avoid missing leading changes, such as a EM firm increased its leverage from 1% to 3%, which will be categorized into the high change category. However, there is no such EM firm.

crisis period, while 1,856 of them reported that they used more debt in the post-crisis

period. According to Table 9, firms that reported different magnitudes of debt usage in

the post-crisis period are evenly split in each group, and there is no aggregate variation in

industry level. Based on table 10, there are 711 firms with complete data in the sample

period reported that they have average leverage ratios above 50% in the pre-crisis period.

552 of them experienced leverage usage reductions in the post-crisis period, and most of

them reported that they reduced debt usage significantly[39]. 159 firms reported over 50%

leverage ratios in the pre-crisis period experienced leverage usage increases in the post-

crisis period. On the contrary, 115 out of these 159 firms decided to increase debt usage

within 20% of their pre-crisis leverage level. Thus, there are more EM firms with more

than 20% leverage ratios before the global financial crisis reduced debt usage in the post-

crisis period.

Table 2 and 3 suggest that there is no difference between the numbers of EM firms

that decided to increase debt usages nor the number of EM firms that decided to reduce

debt usages in the post-crisis period. However, Table 8, 9 and 10 suggest that EM firms

with different level of debt usage in the pre-crisis period have entirely different reactions

on debt usage after the global financial crisis. Most EM firms with relatively low pre-

crisis debt usages preferred to take advantages of extra money supply created by the QEs

and they raised significant amount of external debt in the post-crisis period. Impacts of

the extra money supply not only influenced EM firms with a relative low level of

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[39] Only 149 out of 552 firms reported debt usages reduced within 20%.

leverage prior the crisis period, but EM firms with mid to high level of leverage prior the crisis period are also impacted.

To sum up, there is 65%[40] of EM firms with average leverage ratio below 20% in the pre-crisis period increased their debt usage in the post-crisis period. On the contrary, there is 41%[41] of EM firms with more than 20% average leverage ratios in the pre-crisis period decided to use more debt in the post-crisis period. Therefore, study on capital structure determinants of EM firms should provide a better understanding on these firms' debt usage variations. The following section will illustrate all capital structure determinants.

Determinants of capital structure

In this study, I use determinants that are motivated by prior empirical analyses and the fundamental capital structure theories, namely the "trade-off theory" of capital structure and the "pecking-order theory". Different theories suggest varying factors with different directional effects on firms' capital structure. All determinants are in ratios except size[42]. As shows in Table 4, previous studies have established a set of standardized firm-level determinants for analyzing capital structure (Rajan and Zingales, 1995; Booth et al., 2001; De Jong et al., 2008; Fernandes, 2011). These standardized firm-level determinants of capital structure are profitability, growth opportunities, asset tangibility, firm size, business risk, and effective tax rate. Table 11 shows the measurements for each determinant that I use in this paper.

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[40] 1,993 out of 3,081 of them.
[41] 2,015 out of 4,940 of them.
[42] Nature logarithm of total assets in USD is the measurement for firm size.

Table 11: Determinants and Measurements

Determinants			
Firm-level	**Measurement**	**Firm-level**	**Measurement**
Profitability	Return on Asset (ROA)	**Business risk**	Standard deviation of operating margin[43] of previous three years (Risk)
Growth opportunities	Market-to-Book value of total asset (MKB)	**Effective Tax rate**	Tax paid / EBIT (Tax)
Asset Tangibility	Fix asset / Total Asset (Tangibility)	**Degree of Internationalization**	Foreign Sales to Total Sales (FSTS)
Firm size	Log of Total Asset in USD (Size)		

Note: All firm-level data is collected from Worldscope database via Datastream.

Return on assets is a common measurement for profitability in capital structure literature (Rajan and Zingales, 1995; Booth et al., 2001; De Jong et al., 2008; Fernandes, 2011). Similar to Myers (1977), Rajan and Zingales (1995), Lemmon and Zender (2010), Akdal (2010), Fernandes (2011), and Harrison and Widjaja (2014), I measure firms' growth opportunities through the market-to-book value of the total asset. According to previous capital structure studies (Rajan and Zingales, 1995; Giannetti, 2003; De Jong et al., 2008; Akdal, 2010; Fernandes, 2011; Harrison and Widjaja, 2014), asset tangibility is measured by the fixed assets to total assets ratio[44]. I also uses the natural logarithm of the total asset[45] to measure firm size, and this is the same proxy used in previous literature (Fernandes, 2011). As in Allayannis et al. (2003), Booth et al. (2001), Giannetti (2003),

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[43] The operating margin is the ratio of EBIT over sales.
[44] Fixed assets are measured by the value of property, plant, and equipment in local currency, and total assets are also measured by the local currency term.
[45] To maintain consistency of firm size in across emerging-market, I collect total assets in USD instead of total assets in local currency.

and Fernandes (2011), firm's business risk is used as a proxy for financial distress. Business risk is measured as the standard deviation of firms' operating margins over the last three years. Effective tax rate to measure tax shield, and effective tax rate is the ratio of income tax paid divide by pretax income (Fernandes, 2011).

Table 12 provides descriptive statistics for independent variables. Unlike other variables that are controlled at the 1 and 99% level, the degree of internationalization is only controlled at the 99% level. The degree of internationalization is used to test the second set of hypotheses, and firms reported 0% FSTS means that their main markets are their domestic markets. Over 50% of them reported FSTS ratios have 0% FSTS[46]. Therefore, it does not make sense to control the FSTS ratio at the bottom 1% level. Moreover, correlations between variables are also likely to cause inaccurate regression results, Appendix 1 shows the correlations between variables and confirms that sample data set does not have correlation problems.

Table 12: Descriptive statistics of independent variables used in this paper

	Mean	Median	S.D.	Min	Max	Observation
Growth	1.872572	1.24	2.052965	-3.88	18.19	106,541
Profitability	5.595125	5.25	7.920159	-31.84	36.41	113,930
Size	5.125613	5.083671	0.699686	2.50515	7.3848	122,747
Tangibility	34.4877	32.45587	21.25894	1.24E-05	97.99527	123,927
Effective tax	23.54143	22.41	13.41157	0.01	85.55	91,239
Business risk	6.659678	2.997669	14.18871	0.136504	203.8651	106,380
Degree of internationalization	18.04593	0	28.56291	0	100	51,946

Note: Table 10 shows measurements for independent variables. All ratios are controlled at the bottom and top 1%, except the degree of internationalization.

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[46] The median of FSTS ratio is 0.

When testing the hypothesis that determinants of capital structure have different impacts prior to, during, and post the global financial crisis, the descriptive statistics for all variables during the whole period does not provide the overview of the sample in different periods. Therefore, to align with hypothesis 1, Table 13 shows the descriptive statistics of all independent variables in three different time periods: prior to (2000 – 2006), during (2007 – 2009) and post the global financial crisis (2010 – 2014).

Table 13 suggests that most variables did not experience significant movement in their average and median, however there are five key changes that are worth mentioning. To begin with, both mean and median leverage ratios declined over time. Although the credit to non-financial EM sectors surged during the sample period, listed firms use less debt on average over time. Furthermore, it is peculiar that EM listed firms have the highest average growth opportunities during the crisis period (2007 – 2009) while developed economies were in deep recessions. This may be because investors chased higher return and invested in EM firms, pushing the equity value upward during the crisis period. Thus, the market value over book value ratios experienced an abnormal increased at that time.

Table 13: Descriptive statistics of independent variables in different time periods.

Descriptive Statistics of variables in the Pre-Crisis period (2000 – 2006)						
	Mean	Median	S.D.	Min	Max	Observation
Growth	1.85	1.2	2.10	-3.88	17.46	32,835
Profitability	6.03	5.6	8.03	-31.82	36.38	35,932
Size	5.03	4.997	0.66	2.51	7.124	41,662
Tangibility	37.35	35.73	21.22	0.000641	97.995	41,943
Effective tax	23.73	23.37	13.66	0.01	85.43	30,240
Business risk	6.97	3.096751	15.08	0.1365	203.76	30,556
Degree of internationalization	12.99438	0	23.97	0	100	13,427

Descriptive Statistics of variables in the During-Crisis period (2007 – 2009)						
	Mean	Median	S.D.	Min	Max	Observation
Growth	1.95	1.25	2.167	-1.87	17.46	23,881
Profitability	6.04	5.63	8.365	-31.82	36.41	26,881
Size	5.067	5.013	0.707	2.848	7.21	28,763
Tangibility	34.01	31.996	21.08	0.000781	97.795	29,057
Effective tax	23.798	22.84	13.76	0.01	85.51	21,667
Business risk	6.238	2.794	13.16	0.137	201.6	24,643
Degree of internationalization	13.275	0	25.077	0	100	10,983

Descriptive Statistics of variables in the Post-Crisis period (2010 – 2014)						
	Mean	Median	S.D.	Min	Max	Observation
Growth	1.85	1.26	1.96	-1.86	18.19	49,825
Profitability	5.05	4.85	7.56	-31.84	36.41	51,117
Size	5.234	5.20	0.711	3.048	7.3848	52,322
Tangibility	32.48	30.12	21.14	1.24E-05	97.86	52,927
Effective tax	23.25	21.66	13.01	0.01	85.55	39,332
Business risk	6.678	3.04	14.11	0.137	203.87	51,181
Degree of internationalization	22.41196	3.83	31.10405	0	100	27,536

Notes: All ratios are controlled at the bottom and top 1%, except the degree of internationalization.

Additionally, EM listed firms tend to have higher asset tangibility before the global financial crisis. In other words, EM listed firms' asset tangibility gradually reduced over

the sample period. In addition, on average, the profitability ratio[47] of EM listed firms declined in the post-crisis period. This reduction in profitability is consistent with the emerging markets' economic and business environments. The global financial crisis significantly initially impacted developed markets, but such impacts gradually spread to emerging markets shortly after the European debt crisis and the QE programs led by developed economies' central banks. Thus, it is very likely that the profitability of EM listed firms did not show changes before 2010. On the contrary, the consequences of QE programs and investments from developed markets changed financial environments in emerging markets, and borrowing became easier for EM firms. Wheatley & Kynge (2015) suggested that EM firms borrowed more than they should when both developed and emerging markets ran quantitative easing program. Thus, EM firms' total sizes increased after 2010, encumbering a decline in ROA to decline during the post-crisis period. Lastly, EM listed firms' degree of internationalization shows significant changes during the post-crisis period. The number of EM firms reported FSTS increased from 2,000 prior to the crisis period to 6,534 in the post-crisis period. Over half of EM firms that reported FSTS did not expand to foreign markets. However, the median of FSTS increased from 0 to 3.83%, while average increased from 13% to 22% over the sample period. This finding supports that EM firms became more important in the global business arena.

Previous literature also suggested that institutional factors affect EM firms' leverage decisions (Beck et al., 2002; Caprio and Demirguc-Kunt, 1998; Claessen et al., 2001; Demirguc-Kunt et al., 1996, 1999, 2015; Fernandes, 2011). Although Fernandes

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[47] Measured by ROA

(2011) suggested that country-specific factors transferred their impacts on firms' leverage

decisions to firm-specific factors, I want to explore whether financial institutions of

emerging markets impact listed firms' leverage usage due to the global financial crisis.

To measure financial institutions across all emerging markets in the sample, the Financial

Development and Structure Dataset (Beck et al., 2000, 2009; Cihak et al., 2012) from

World Bank is used. Table 14 shows six common institutional factors to measure a

country's financial depth.

Table 14: Institutional indicator for financial sector

	Description	**Source**
LIQUID LIABILITIES to GDP (%)	Ratio of liquid liabilities to GDP	Raw data are from the electronic version of the IMF's International Financial Statistics
PRIVATE CREDIT BY DEPOSIT MONEY BANKS to GDP (%)	Private credit by deposit money banks to GDP	
PRIVATE CREDIT BY DEPOSIT MONEY BANKS AND OTHER FINANCIAL INSTITUTIONS to GDP (%)	Private credit by deposit money banks and other financial institutions to GDP	
FINANCIAL SYSTEM DEPOSITS to GDP (%)	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP	
STOCK MARKET CAPITALIZATION to GDP (%)	Value of listed shares to GDP	Standard and Poor's Emerging Market Database (and Emerging Stock Markets Factbook)
STOCK MARKET TOTAL VALUE TRADED to GDP (%)	Total shares traded on the stock market exchange to GDP.	

Sources: the Financial Development and Structure Dataset (Beck et al., 2000, 2009; Cihak et al., 2012) from World Bank.

In the following section, I will introduce the empirical methodologies that are used

to explore the changing dynamic of listed EM firms' capital structure.

Methodology

Out of 10,861 sample firms, there are 6,480 companies with complete data in both pre-crisis (2000 – 2006) and post-crisis (2010 – 2014) periods reduced their leverage ratio, whereas 4,327 firms saw an increase. Listed EM firms also reported a lower usage of leverage across the sample period. I will conduct a series of regression analyses in this study to test these two sets of hypotheses and explain the change in listed EM firms' leverage usage in the post-crisis period.

Firstly, I employ logistic binary regression to investigate factors in the pre-crisis period that caused EM firms' debt usage decision in the post-crisis period. In other words, how firm-specific factors and financial institutional factors can be used to predict the change in EM firms' leverage usage in the post-crisis periods. I use firms' leverage ratio in 2006 as a reference year of the pre-crisis and 2011 as a reference year of the post-crisis. I create a binary dependent variable for the logistic binary regression. If an EM firm used more debt in 2011 than used in 2006, the binary variable will be coded 1, and if an EM firm used less debt in 2011 than 2006, the binary variable will be coded as 0. I use 2006's firm-level indicators that we discussed in Table 11 as independent variables except DOI[48]. Industry classification and these six institutional indicators listed in Table 14 are also included in the logistic binary regression.

Due to high correlations between these institutional factors[49], the principal component analysis (PCA) is employed to extract institutional factors in each country's financial sector. As a result of the PCA[50], these 6 financial indicators generate two

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[48] It is unclear that DOI will affect emerging-market firms' leverage usage yet.
[49] See correlation in Appendix 2.
[50] Result of PCA is shown in Appendix 3.

factors, and explain 77% of total variations of these six financial institutional indicators.

Table 15 shows both factors' loading situations from these 6 financial institution

indicators from the PCA. Factor 1 explains the credit situation of a nation, while Factor 2

explains the investment situation of a nation.

Table 15: Result of Principal Component Analysis

	Component	Loading
Factor 1	LIQUID LIABILITIES to GDP (%)	0.964
	PRIVATE CREDIT BY DEPOSIT MONEY BANKS to GDP (%)	0.948
	PRIVATE CREDIT BY DEPOSIT MONEY BANKS AND OTHER FINANCIAL INSTITUTIONS to GDP (%)	0.859
Factor 2	FINANCIAL SYSTEM DEPOSITS to GDP (%)	0.718
	STOCK MARKET CAPITALIZATION to GDP (%)	0.847
	STOCK MARKET TOTAL VALUE TRADED to GDP (%)	0.713

As a result, the binary logistic regression equation with two financial institution

factors are:

$$P(leverage\ change\ dummy)$$
$$= \frac{e^{b_1*ROA_{(i,t)}+b_2*Size_{(i,t)}+b_3*Tangibility_{(i,t)}+b_4*MKB_{(i,t)}+b_5*TAX_{(i,t)}+b_6*RISK_{(i,t)}+b_7Factor+b_8Factor2+Industry\ dummys}}{1 + e^{b_1*ROA_{(i,t)}+b_2*Size_{(i,t)}+b_3*Tangibility_{(i,t)}+b_4*MKB_{(i,t)}+b_5*TAX_{(i,t)}+b_6*RISK_{(i,t)}+b_7Factor\ 1+b_8Factor\ 2+Industry\ dummys}}$$

This binary logistic regression model is a cross-section model, and it can only

explore whether both firm-specific and country-specific financial institution factors

predict listed EM firms' leverage usage in the post-crisis period. To explore the changing

dynamic of listed EM firms capital structure determinants, a series of panel regressions are deployed.

The dependent variable in panel regressions is, in market value terms, firms' total debt to total asset ratio. Regression models will use EM firms' leverage determinants presented above as independent variables. Recent financial literature commonly used panel regressions[51], and this study is not an exception. Panel data regressions will be repeated in the four sample periods: the overall sample period (2000 – 2014), prior to (2000 – 2006), during (2007 – 2009) and post the global financial crisis (2010 – 2014).

I start with a well-established set of firm-level determinants for analyzing capital structure in previous studies (Rajan and Zingales, 1995; Booth et al., 2001; De Jong et al., 2008; Fernandes, 2011). These standardized firm-level determinants of capital structure are profitability, growth opportunities, asset tangibility, firm size, business risk, and effective tax rate. As a fundamental principle of data analysis, the size of the sample has a positive relationship with its regression's explanation power[52]. Thus, to ensure maximum explanation power, I will deploy three panel regression models.

Firstly, a set of four firm-level variables is included, and the model is similar to Rajan and Zingales (1995) and Fernandes (2011). The estimated regression equation only utilizes profitability, firm size, asset tangibility, and growth opportunities to predict firms' leverage:

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[51] The pooled regression model does not imply since the sample contains more cross-section than time-series data, and the pooled data regression cannot be executed in the 2007 – 2009 sample period due to not enough time-series observations.
[52] See observation numbers of each variable in Table 12.

$$Leverage_{(i,t)} = \beta_0 + \beta_1 * ROA_{(i,t)} + \beta_2 * \log(total\ asset)_{(i,t)} + \beta_3 * \frac{fix\ asset}{total\ asset_{(i,t)}} + \beta_4$$

$$* \frac{MKT\ Value\ of\ Asset}{Book\ Value\ of\ Asset_{(i,t)}} + Year\ dummys + Industry\ dummys$$

$$+ country\ dummys + \epsilon_i$$

The first model has 10,620 firms from 22 emerging markets and 91,206 total firm-year observations over the period from 2000 to 2014. In comparison, Fernandes (2011) has 9,492 listed companies from 30 emerging and developing markets and 64,938 total firm-year observations over the period between 1990 and 2007. In other words, my study will benefit from the extra sample size.

The second model expands the first model with two additional independent variables added. The second model contains four main determinants from model 1, and also includes the effective tax rate and the business risk. The second model has 10,114 firms, but the total firm-year observations drop to 62,539.

$$Leverage_{(i,t)} = \beta_0 + \beta_1 * ROA_{(i,t)} + \beta_2 * \log(total\ asset)_{(i,t)} + \beta_3 * \frac{fix\ asset}{total\ asset_{(i,t)}} + \beta_4$$

$$* \frac{MKT\ Value\ of\ Asset}{Book\ Value\ of\ Asset_{(i,t)}} + \beta_5 * TAX_{(i,t)} + \beta_6 * RISK_{(i,t)} + Year\ dummys$$

$$+ Industry\ dummys + country\ dummys + \epsilon_i$$

To test the second hypothesis of whether or not the degree of internationalization impacts EM listed firms' capital structure decisions, I introduce the third model. The third model builds upon the second model and includes the degree of internationalization, which is measured by the foreign sales to total sales ratio. The third model also

continually reduces sample size. It only contains a total of 7,041 firms and 29,640 firm-year observations.

$$Leverage_{(i,t)} = \beta_0 + \beta_1 * ROA_{(i,t)} + \beta_2 * \log(total\ asset)_{(i,t)} + \beta_3 * \frac{fix\ asset}{total\ asset_{(i,t)}} + \beta_4$$

$$* \frac{MKT\ Value\ of\ Asset}{Book\ Value\ of\ Asset_{(i,t)}} + \beta_5 * TAX_{(i,t)} + \beta_6 * RISK_{(i,t)} + \beta_7 * FSTS_{(i,t)}$$

$$+ Year\ dummys + Industry\ dummys + country\ dummys + \epsilon_i$$

Time-series and cross-sectional dependences are two major concerns for panel regression models. Previous studies did not clearly specify the exact specifications of the panel regression model (De Jong et al., 2008; Fernandes, 2011). In a study of 10,000 firms from 30 emerging and developing markets, Fernandes (2011) engaged panel regressions with standard errors adjusted for clustering at the country level. Petersen (2009) argued the residuals produced by panel regressions may be correlated across either time or cross-sectional (firms) dimensions, and OLS models produce biased standard errors. He reported that standard errors clustered on one dimension (such as time dummy) could be a solution for maintaining unbiased standard errors and producing correctly sized confidence intervals. The GLS model and other techniques may be able to improve the panel regression. Petersen (2009) also suggested that multiple parameters are clustered with sufficient categories in each dimension, unbiased standard errors and correctly sized confidence intervals can be achieved through panel regression. Moreover, Fernandes (2011) also conducted a series of annual cross-sectional analyses with the firm-level variables. Observing coefficients and their significance level over time, he concluded that there were changing patterns for these firm-level determinants over time. This approach has one main drawback. Panel regressions with the same variables but

different time periods and cross-sections produce coefficients that can be only interpreted as the average impact of these variables for each sample period. Thus, these coefficients cannot be correctly representing the true relationships between the dependent variable and independent variables of the population. In other words, these coefficients are only point estimates and cannot be directly compared. Furthermore, when there are a large numbers of cross-section observations in the panel data as the one used in this paper, the cross-section heteroskedasticity will be likely to distort the regression results.

I intend to fill these two gaps discussed above by improving empirical models used in previous studies. Firstly, to build upon Fernandes (2011) and Petersen (2009), this study will use panel regressions with standard errors adjusted for clustering at multiple dimensions instead of only clustering at country level in Fernandes (2011). These regression models will be conducted with unbalanced panel data sets, since every period contains different numbers of firm-year observations (the detail in Table 13). My analyses will include three sets of clustering dummy variables, and the sample will incorporate time-dummy, industrial-dummy, and country-dummy[53]. By doing this, the regression model should produce unbiased standard errors and correctly sized confidence intervals (Petersen, 2009). Additionally, to prevent the cross-section heteroskedasticity, this article uses the GLS with cross-section weights model to encounter the problem (Petersen, 2009).

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[53] The data set 21 country-level dummies, 7 industrial dummies, and 14 year-dummy.

Secondly, Good and Hardin (2009) suggested that interpreting confidence intervals[54] of regression's estimated coefficients are the correct way to interpret regression results, and directly comparing coefficient of the same model but different time periods is only point estimates. Good and Hardin (2009, P45, P56) stated:

> "Point estimates are seldom satisfactory in and of themselves. First, if the observations are continuous, the probability is zero that a point estimate will be correct and will equal the estimated parameter. Second, we still require some estimate of the precision of the point estimate….Interval estimates are to be preferred to point estimates; they are less open to challenge for they convey information about the estimate's precision."

Instead of directly comparing coefficients through point estimates, I will compare confidence intervals of coefficients from the same regression model with different time periods (Good and Hardin, 2009). By doing so, confidence intervals of a coefficient can be interpreted as the true relationship between dependent and independent variables. Confidence intervals are manually calculated with the following formula:

$$\text{confidence intervals}_{\beta_n} = \beta_n \pm t_{(2.5\%, n-k-1)} S_{\beta_n}$$

To identify the changing dynamic of capital structure determinants over these three sample periods[55], three confidence intervals for each determinant's coefficient will be compared. If regression models with different sample periods produce overlapped

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[54] Confidence intervals are a calculated range that includes the true value of a specified item (commonly the mean, in this case, the true relationship between dependent and independent variables) in a specific percentage.

[55] The three sample periods are based on Table 12, there are prior to (2000 – 2006), during (2007 – 2009) and post the global financial crisis (2010 – 2014).

confidence intervals of the coefficient for the same variable, it is statistically proven that the variable has a similar influence on the dependent variable in a different period. On the contrary, if the same determinant's coefficient has confidence intervals that do not overlap with other period's, then this is empirical evidence that the determinant has different levels of impact for EM listed firms' leverage ratio in a different period.

In the following section, I will first investigate the EM listed firms' capital structure determinants. Panel data regressions will be conducted with the overall sample period (2000 – 2014). Secondly, this section will focus on how capital structure determinants have changed over time. Panel data regressions will be repeated with the three sub-sample periods, prior to (2000 – 2006), during (2007 – 2009), and post the global financial crisis (2010 – 2014).

Results and Discussion

Binary logistic regression

The binary logistic regression is reported in Table 16. The analysis covers only 2,895 out of 10,861 listed EM firms, which is due to the limited number of listed EM firms in 2006. Of these 2,895 firms, there are 1,355 firms reported a lower debt usage in 2011 than in 2006, with 1,540 firms reporting higher debt usage in 2011 than in 2006. This circumstance opposes to the descriptive statistics on the whole sample in Table 9 and 10[56], where more firms experienced leverage reduction rather than a leverage increase.

In table 16, the binary logistic regression model shows that the model's predicting accuracy has an average of 54.8% of on EM firms' debt usage decisions after the global financial crisis. The model correspondingly predicts 74.2% of firms increased debt usage accurately, but only 32.8% for firms reduced debt usage in the post-crisis period. There are also mixed results for each independent vatiables.

The majority of firm-level capital structure determinants between 2006 and 2011show significant predictive power in the EM firms' leverage movements. Firms' growth options, profitability, size of firm, and asset tangibilities[57] are significant factors

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[56] In Table 8 and 9, there are 6,480 out of 10,861 listed emerging-market firms reduced their debt usage in the post-crisis (2010 – 2014) than in the pre-crisis (2000 – 2006) periods.
[57] Tangibility indicator is only significant at the 10% level.

in predicting a firm's leverage movements in the post-crisis era, but neither

effective tax rate nor business risk show contribution on the prediction. Firms' growth,

profitability, size, and asset tangibilities are often follow similar changing trends.

Although the global financial crisis impacted EM firms, these indicators still carry

predicting power for firms' leverage movement after the global financial crisis. Firms'

effective tax rates and income volatilities in 2006 can only reflect firms' situation that

given year, and they cannot provide any long-term influence on firms' leverage decisions.

In terms of industry dummies, none of them are significant and indicating that there is no

industry variation in predicting EM firms' debt usage changes.

Table 16: Results of the binary logistic regression

Classification Table[a]

			Predicted		
			leverage		Percentage
Observed			0	1	Correct
Step 1	leverage	0	444	911	32.8
		1	397	1143	74.2
	Overall Percentage				54.8

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	MKB	-.055	.025	4.695	1	.030	.947
	ROA	.027	.008	10.715	1	.001	1.027
	SIZE	.141	.063	4.958	1	.026	1.151
	Tangibility	-.001	.001	3.436	1	.064	.999
	tax	.000	.003	.004	1	.953	1.000
	risk	-.001	.004	.112	1	.738	.999
	Agriculture	-.194	.310	.393	1	.531	.823
	Mining	-.228	.253	.809	1	.368	.796
	Construction	-.002	.176	.000	1	.991	.998
	Manufacturing	-.121	.132	.842	1	.359	.886
	Utilities	.015	.171	.008	1	.929	1.015
	Wholesale	.015	.176	.008	1	.931	1.015
	Retail	-.189	.220	.739	1	.390	.827
	FAC1_1	-.094	.044	4.594	1	.032	.911
	FAC2_1	.024	.035	.480	1	.488	1.025
	Constant	-.611	.370	2.722	1	.099	.543

Based on Table 2 and 3, there are similar numbers of firms experienced debt usage increases as well as declines in every industry. The global financial crisis posted significant chanllenges on all industries in emerging markets, especially on their financing environments. Thus, the prediction of EM firms' leverage usage in the post-crisis period does not distinguish firms' industry status. Results of both credit and equity institutional factors[58] show surprising findings. The first factor is a signifiacnt indicator in the prediction, while the second factor shows insignificant result. In other words, only emerging markets' liquidit and credit situations in the pre-crisis period influenced firms' debt usage decision in the post-crisis period. While for emerging markets, financial investment situations and equity-market depth in the pre-crisis period did not impact

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[58] See detail of factors in Table 15.

firms' leverage decisions in the post-crisis period. This finding partially supports

Fernandes (2011), that institutional factors slowly transform their impact on firms'

leverage to firm-specific factors. In addition, the global fiancial crisis created worldwide

equity market fluctuations. The predicting power of EM listed firms' equity performances

are severly impacted by the aftermath of the global financial crisis. Thus, institutional

factors of investment and equity-market depth are not a predicting factor for EM firms'

leverage decision in the post-crisis period. Overall, the model provides some important

insights that firm-specific factors and institutional factors on credit market depth are

predicting EM firms' debt usage in the post-crisis period.

In terms of the directional impact of significant variables, Table 16 shows that EM

firms' growth options and sizes of total assets in the pre-crisis period have negative

relationships with firms' debt usage in the post-crisis period. However, the magnitude of

these relationships vary significantly. The negative correlation between firms' growth

and debt usage is supporting the "pecking-order theory" that firms would used less debt

to prevent underinvestment problems. Moveover, this finding is also supporting " market

timing theory." When EM firms have more growth options[59], firms' equity values are

commonly selling at higher prices than firms have fewer growth opportunities. Thus, EM

firms would attract more capital through equity issuances than debt issuances, and their

leverage ratios would decline in this situation. On the contrary, total size of EM firms[60] in

the pre-crisis period has the highest influence on firms' decisions to increase debt usage

in the post-crisis period. This is consistent with both the "pecking-order theory" and the

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[59] Growth options are measured by market-to-book value of firms' total assets.
[60] Sizes of firms are measured by the normal log of firms' total assets in USD.

"agency theory", as the relationship between firms' size and asymmetric information should be negative.

EM firms' profitabilities in the pre-crisis period have a positive influence on firms' likihood to increase debt usage, so the "pecking-order theory" is not supported. Profitable firms often have higher abilities to service their debt. In addition, EM firms were generally experiencing high growth during the pre-crisis period[61], and the aftermath of the global financial crisis provided expansion opportunities in developed markets for EM firms. Therefore, firms' profitabilities in the pre-crisis period have a positive impact on debt usages in the post-crisis period in a high growth environment.

The asset tangibility[62] of EM firms in the pre-crisis period only provides an extremely small prediction on firms' decision to reduce debt usage in the post-crisis period[63]. This is inconsistent with both the "pecking-order theory" and the "agency theory." It can be argued that firms' asset tangibility is not a long-term predicting criteria for firms' leverage decision, and the global financial crisis further enlarges the inconsistency of the prediction.

In addition, the result suggests that credit market depths of emerging markets in the pre-crisis period have the largest negative impact on firms' decision to increase leverage usage in the post-crisis period. Credit market depths are measured by three criteria[64], as listed in Table 16. Thus, the negative relationship between credit market depths in the

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[61] The global financial crisis had different level of impacts on emerging markets, and timing of impacts also vary country by country.
[62] It is only significant at 10% level.
[63] The coefficient is only -0.001.
[64] Increased credit market depths means that more credit is avaiable to new lenders.

pre-crisis and firms' leverage usage in the pre-crisis may be caused by the changing in creditors' risk averseness during the crsisis period. Although both equity and credit markets were affected by the global fianncial crisis, credit markets are less volatile in general than equity markets in adverse economic situations. Moreover, the QE programs lead by developed markets did not show their impacts on emerging markets until 2011 (Wheatley & Kynge, 2015). These three elements of credit market depths did not show high variations between 2006 and 2011; thus, this finding suggests that both EM firms and creditors are risk averse during the crisis period.

The binary logistic regression shows that EM firms' post-crisis decisions on level of debt usage are influenced by some firm-specific factors and firms' domestic credit-market depths in the pre-crisis period. However, capital structure determinants over the whole sample period remain unsolve, and the following sections will address this issue.

Capital structure determinants

In accordance with panel regressions presented in the previous section, three different panel regression models are conducted to find firm-level capital structure determinants. Table 17 reports estimated coefficients from regression models listed in the Methodologies section. Model 1 only contains four commonly evaluated firm-level determinants that were used in previous literature (Rajan and Zingales, 1995; Fernandes, 2011). Model 2 extends model 1 by including two additional determinants of capital structure, namely effective tax rate and business risk (Fernandes, 2011). In model 3, the degree of internationalization is joined to explain EM firms' leverage ratio.

From Table 17, all capital structure determinants are highly significant at the 1% level in both model 1 and 2, and most determinants are also highly significant at the 1%

level in model 3[65]. More importantly, every determinant shows same directional impact

on firms' leverage across different models. As mentioned in the previous section, the

number of observations and cross-sections in each model decline when more

determinants are added. However, the relationship between number of oberservations and

regression's explanation power is not as expected. In fact, the strength of regression

models increases noticeably when more determinants are used. The unweighted adjusted

R^2 of regression models remained similar in all models.

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[65] Only the business risk (RISK) is significant at 10% level, the degree of internationalization (FSTS) is significant at 5% level.

Table 17: Determinants of capital structure in emerging markets

	Panel EGLS (Cross-section weights)					
	Model 1		Model 2		Model 3	
MKB	0.358772	***	0.167838	***	0.064683	***
	17.65391		8.458696		3.507215	
ROA	-0.58317	***	-0.67562	***	-0.70306	***
	-121.509		-125.682		-100.816	
SIZE	6.163132	***	5.868518	***	5.616781	***
	122.9841		122.3846		123.9495	
TANGIBILITY	0.176722	***	0.153962	***	0.181671	***
	104.6574		98.08048		109.7051	
TAX	-		0.013262	***	0.002184	
			5.485311		0.945648	
RISK	-		0.03973	***	0.003377	
			14.9553		1.001243	
FSTS	-		-		0.002506	**
					2.305566	
R-Square (Unweighted)	0.1832		0.175		0.194	
Cross-sections	10620		10114		7041	
Observation	91206		62539		29640	
Effect:						
Year Dummy	X		X		X	
Country Dummy	X		X		X	
Industry Dummy	X		X		X	

This table reports estimated coefficients from the panel regression of leverage ratios. The regression model is the estimate generalized least squared panel regression model with cross-section weights (Panel EGLS with cross-section weights). All regression models correct for heteroskedasticity by engaging standard error adjusted for clustering at country, year, and industry dimensions (Petersen, 2009). All independent variables are explained in Table 11, and their descriptive statistics are showed in Table 13. T-statistics are reported below the estimated coefficients. Significant level of estimated coefficients at the 1, 5, and 10% levels are showed next to coefficients as ***, **, and *, respectively.

All models show that EM listed firms with higher growth opportunities would

prefer higher debt usage. This positive relationship between firms' growth and debt

usages supports the "dynamic trade-off theory" that EM firms would maintain the

optimal capital structure so that they will acquire additional debt when equity value is

high. However, this finding is inconsistent with the binary logistic regression presented above. This may be due to that majority of EM firms in the sample for binary logistic regression reported that they acquired more debt in the post-crisis. Comparing firms plan to acquire additional debt and firms plan to reduce their debt usage, managers should have very different prespectives on firms' debt overhang problems. Since panel regression models include more EM listed firms, opposite findings on the impact of firms' growth potential and debt usage should not be compare directly.

Other previous literature with older data sets on emerging- and developing-market firms (Akdal, 2010; Fernandes, 2011; Frank and Goyal, 2006; Titman and Wessels, 1988) also found different opposite result. These studies generally supported the "pecking-order theory" that firms would forgo profitability opportunities to avoid debt overhang issues (Jensen & Meckling, 1976; Myers, 1977). Moreover, while most of these studies focused on DC firms, Fernandes (2011) studied the emerging- and developing-market setting before the global financial crisis, where he also found support for the "pecking-order theory". This finding also shows no support for the "market timing theory." According to the "market timing theory ", EM firms with higher equity values[66] should issue additional equity if additional capital is needed. However, although this result does not support these two major capital structure theories, this finding is similar to some capital structure studies on developed market firms (Allayannis et al., 2003; Lemmon and Zender, 2010; Wald, 1999), they supported the positive relationship between firms' leverage and growth. Although these analyses did not exclusively focus on EMs, they explored firms'

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[66] A high market-to-book ratio of total assets means a firm's share price is higher than book value of the stock.

capital structure determinants in markets with either a high growth rate or booming internationalization. Firms expand repeatedly when domestic economies or internationalization are growing at high rates, these expansions generally require additional capital investment; thus, it is not unreasonable for EM firms to acquire additional debt to sustain their growth. The opportunities cost for missing these market opportunities outweigh the underinvestment problem. In other words, in the sample period, EM firms treat growth options in leverage decisions similarly to such decisions made by DC firms in the 90s and early 2000s.

Results in Table 17 also show that there is a negative relationship between EM listed firms' leverage and their profitability. The negative relationship between profitability and leverage is consistent with previous research (Allayannis et al., 2003; Booth et al., 2001; Ferenandes, 2011; Myers and Majluf, 1984; Rajan and Zingales, 1995; Titman and Wessels, 1988; Wald, 1999). This finding indicates that retained earnings are the prioritized sources of capital. Thus, the "pecking-order theory" and the "agency theory" are supported, since asymmetric information of firms would increase the cost to issue additional debt and profitable firms tend to have less likelihood to acquire external capital.

Table 17 shows that EM listed companies with large total assets and large tangible assets can withstand higher usage on debt. The positive relationship between firms' size and debt usages is consistent with previous studies (Bartelsman et al., 2003; Graham, 2000; Fernandes, 2011) and capital structure theories. This finding is also in line with the "trade-off theory" for the following two reasons: 1). Haugen and Senbet (1978) suggested that bankruptcy costs are a relatively small portion of firms' total value. 2). Larger firms

can be more diversified than their smaller size counterparts, which should reduce their business risks and default risk. In addition, the positive relationship between firms' asset tangibility and debt usages is in line with major capital structure literature (Abor, 2007; Akhtar, 2005; Fernandes, 2011; Frank and Goyal, 2003; Harris and Raviv, 1991; Jensen & Meckling, 1976; Myers, 1977; Rajan and Zingales, 1995) and also consistent with capital structure theories in two ways. Firstly, bankruptcy costs would be lower for firms with more tangible assets than firms with fewer tangible assets (Jensen & Meckling, 1976; Myers, 1977; Abor, 2007). Secondly, corporate outsiders can value tangible assets much easier than value intangible assets, and creditors often treat tangible assets as collateral during the lending process (Akhtar, 2005). Both findings are also supporting both the "pecking-order theory" and the "agency theory". Large firms generally should have more information for investors and creditors than smaller firms. Issues with asymmetric information problem would be smaller for firms with large size, and less asymmetric information will reduce corporate outsiders' risk when firms are seeking external capital. The same logic is also applied to firms' asset tangibility and asymmetric information, since creditors and investors can price fixed assets easier than price intangible assets. Thus, the relationship between EM firms' size and their leverage and between their asset tangibility and debt usages are positively correlated.

In model 2, results show that firms would prefer more debt if they have more taxes to pay. This finding contrasts the "pecking-order theory" and previous studies (Booth et al., 2001; Fernandes, 2011). Both studies suggested that firms' effective tax rates and debt usages hold a negative relationship, and the tax indicator may not be an appropriate indicator for debt tax-shield. This finding indicates that EM listed firms' leverage

decisions are influenced by the size of the tax-shield, and it is consistent with the "trade-off theory" that companies use tax benefits to promote after-tax income, and firms will adjust capital structure to meet their target leverage ratios. During the sample periods, competition in emerging markets is gradually increasing, especially after the global financial crisis, when international trade is heavily impacted by the crisis. In other word, due to excessive competition from foreign countries and excessive supply in their home market, listed EM firms have to adapt these unfavorable changes in the post-crisis period by reconsidering their business and financial strategies. This finding is a sign that list EM firms change from market driven to efficient driven. When market potential is no longer the main driver for EM firms' investments, they should consider to value their capital project with the weighted average cost of capital (WACC). Debt tax-shield is the main cost reduction element in the WACC. While cost of debt is commonly lower than cost of equity, and debt is also receiving higher hierarchy than equity. Therefore, listed EM firms change their financing perspectives and actively use debt tax-shield and adjust debt-equity mixtures[67] to achieve optimal capital structures and optimal WACCs.

According to results report in Table 17, a firm's business risk is positively impacting its level of debt[68]. This finding is inconsistent with capital structure theories that companies with higher income volatility should not use more debt than their less volatile counterparts. Previous literature does not provide consistent support for the relationship between firms' leverage and business risk. Fernandes (2011) reported the insignificant positive relationship between firms' business risk and leverage for EM firms

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[67] The result of MKB supports this views.
[68] The relationship between firms' leverage and business risk is only significant at 10% level.

between 1990 and 2007. Booth et al. (2001) found that the relationship varies country by country but mostly positively significant with developing-country firms' leverage ratio. While capital structure theories cannot provide an explanation on this positive relationship between firms' leverage and business risk, this finding may be influenced by the methodology to calculate this proxy. This study uses business risk as a proxy for financial distress, which is a commonly used proxy in capital structure literature (Allayannis et al., 2003; Booth et al., 2001; Fernandes, 2011; and Giannetti, 2003). The business risk is measured by the standard deviation of the past three years' operating margins. In other words, this measurement does not discriminate on firms with increasing or decreasing performances over the past three years. Therefore, this finding should be interpreted carefully, and required additional investigation.

In model 3, the FSTS is significant in the 5% level, which indicates EM listed firms' leverage decisions are positively influenced by their degree of internationalization. This finding does not support to the "pecking-order theory" and the "agency theory". Internationalized EM firms typically have higher asymmetric information issues because creditors and investors do not have same information about foreign markets and firms' foreign operations. Both the "pecking-order theory" and the "agency theory" argue that between corporate insiders and outsiders, firm's debt usage should negatively correlate with asymmetric information. It is reasonable to believe that it is more difficult for internationalized EM firms to acquire new debt compare to their domestic focused counterparts. On contrary, this finding supports the "trade-off theory" and the second hypothesis that EMMCs are likely to make their capital structure decision differently than their domestically oriented counterparts. This finding is also consistent with Mansi and

Reeb (2002b). In their study on US MNCs between 1993 and 1997, they found that firm

internationalization has a positive influence on firms' debt usage in general[69]. In other

words, regarding firms' internationalization between 2000 and 2014, EM firms' leverage

decisions are made similarly as DC firms' leverage decisions were made previously. This

similarity may be because both developed- and EM firms were experiencing booming

cross-border expansion in the respective sample periods. To catch these growth

opportunities, firms typically demanded external capital investments[70]. Moreover, during

these booming foreign expansions, both developed- and EM firms were targeting mainly

developed markets. According to Kwok and Reeb (2000), DC firms do not expose to

additional risks when internationalized to developed markets, while EM firms' risk

exposure actually decrease when internationalized to developed markets. Thus, it is

reasonable that EM firms could able to acquire more debt, as they are more

internationalized.

Across these three models, market-to-book ratio (MKB) and return on asset (ROA)

have coefficients that decline when more determinants are added, while SIZE, and

TANGIBILITY have coefficients that are relatively similar. The reduction of MKB's and

ROA's coefficients suggests that some of their variations are explained by newly

introduced determinants in model 2 and 3. Thus, comparing model 1 and model 2, TAX

and RISK, along with MKB and ROA in model 2, explain similar variations than MKB

and ROA in model 1[71]. FSTS further strengthens model 3 with increasing the adjusted R^2

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[69] Mansi and Reeb (2002b) found a non-linear positive relationship between U.S. firms' debt usage and their DOIs.
[70] Retained earnings are constrained by both time and quantity.
[71] Unweighted adjusted R^2 is higher in model 1 than in model 2.

than both model 1 and model 2. Moreover, comparing MKB and ROA across models in regard of their magnitude of estimated coefficients, I first identify that the impact of growth opportunities on firms' debt usage significantly reduce when more determinants are added. Since we use firms' market-to-book value ratios as a proxy to measure firms' growth opportunities, firms' equity values are directly influenced by these newly added variables[72]. For instance, firms' equity value will be negatively impacted by firms' income volatility; thus, business risk will split some MKB's influences on firms' leverage. Secondly, EM firms' effective tax rates also directly influence firms' profitability (Booth et al., 2001; Fernandes, 2011). Therefore, the impact of firms' profitability on leverage decline when effective tax rates were added. In addition, results in model 3 show insignificantly support that internationalized EM firms would prefer more debt if they have more taxes to pay, and internationalized EM firm's business risk does not impact their usage on debt. It is surprising that both determinants are significant in model 2, but fail to explain internationalized EM firms' leverage decisions.

During the overall sample period (2000 – 2014), all empirical models provide consistent results on capital structure determinants[73], but the changing dynamic of capital structure determinants remains for additional assessment. From Table 17, EM listed firms with more growth option, have less profitability, larger size, more tangible assets, higher business risk, higher taxes, and a higher degree of internationalization, can carry more debt. In the following section, I analyze the changing dynamic of EM listed firms' capital structure.

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[72] Correlations among them are relatively low, so it will not create auto-correlation issue.
[73] There is no directional difference between leverage and capital structure determinants among these models.

The changing dynamics of capital structure determinants

Although the overall credit provided to EM firms increased over the sample period, emerging-market listed firms' average leverage ratio experienced a slight decline. This section shows changing dynamic of EM listed firms' capital structure determinants between 2000 and 2014, namely how EM firms adjust their leverage decisions process under impacts of the global financial crisis. Table 12 shows five key changes through presenting the descriptive statistic of variables in different time periods, pre (2000 – 2006), during (2007 – 2009), and post global financial crisis (2010 – 2014): 1) leverage ratio declined over time; 2) higher growth opportunities during the crisis period (2007 – 2009) than other periods; 3) higher asset tangibility before the financial crisis (2000 – 2006); 4) lower profitability in the post-crisis period (2010 – 2014) than other periods; 5) the degree of internationalization increased significantly over time. Since all determinants show significant results in the section above, these changes in independent variables and impacts of the global financial crisis should have impacts on EM firms' leverage decisions.

Moreover, when comparing results reported in my previous section with previous studies, Table 17 shows that there are also three empirical results that require further investigation: 1) the positive relationship between leverage and firms' growth options is inconsistent with most previous studies and capital structure theories; 2) the positive relationship between leverage and tax paid is inconsistent with previous studies; 3) the positive correlation between leverage and business risk is also inconsistent with capital structure theories. Due to severe impacts of the global financial crisis on business and

financial environments around the global, it is critical to examine how capital structure determinants impact leverage decisions in different time periods.

To address the above concerns and to test the first set of hypotheses, this section will investigate EM listed firms' capital structure determinants in different time periods that are used in Table 14. Using the same empirical models in the previous section, Table 18 presents the panel regressions results over three time periods. The sub-sample regression estimates are mostly consistent with the full sample analyses, with there are four interesting facts. Firstly, most determinants behave the same way as they do in the overall model, but there are some insignificant determinants in sub-sample periods. During the crisis period (2007 – 2009), both TAX and RISK are insignificant in model 2. In model 3, the growth (MKB) is insignificant in the prior-crisis period (2000 – 2006), while the degree of internationalization is only significant in the during-crisis period (2007 – 2009). Secondly, results in Table 18 report that in general, sub-sample panel regression models with more determinants have better explanation power[74] on firms' leverage decisions. Thirdly, there are no disagreements on the directional relationship between leverage and five determinants (MKB, ROA, SIZE, TANGIBILITY, and FSTS) in all sub-sample models. Other two determinants (TAX and RISK) show inconsistent directional relationships in sub-sample periods. In model 2, both determinants have insignificant estimated coefficients during the financial crisis period (2007 – 2009). Lastly, on one hand, across different models and different periods, some determinants have coefficients changed in the same pattern, for example, SIZE's and TANGIBILITY's coefficients have the same changing pattern over the sample period, regardless of model

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[74] I use adjusted R^2 to measure explanation power.

1, 2, or 3. On the other hand, not all determinants have coefficients that follow the same changing pattern, such as MKB, ROA, TAX, and RISK. For instance, ROA's coefficient in model 1 follows an increasing pattern over time, peaking in the post-crisis period, but the same determinant's coefficient in both models 2 and 3 peaks in the during-crisis period, and ROA's post-crisis coefficient is higher than its prior-crisis coefficient in model 2 and 3.

From Table 18, we can identify that in different times and models, most determinants have different levels of impacts and coefficients on leverage. However, these changes are inconsistent across these three models, and there is no empirical evidence that each leverage determinant impacts EM firms' leverage differently in different time periods. To find empirical evidences on the existence of changing dynamics of capital structure determinants pre and post the global financial crisis, this study will compare confidence intervals of determinants' coefficients in various periods, as it is discussed in the methodology section.

Table 18: Determinants of capital structure in emerging markets in different time periods

	Model 1			Model 2			Model 3		
	2000 - 2006	2007 - 2009	2010 - 2014	2000 - 2006	2007 - 2009	2010 - 2014	2000 - 2006	2007 - 2009	2010 - 2014
MB	0.349 ***	0.292 ***	0.408 ***	0.249 ***	0.183 ***	0.122 ***	0.050	0.180 ***	0.027
	21.56	12.77	20.22	8.84	14.47	6.15	1.53	6.33	1.43
ROA	-0.544 ***	-0.549 ***	-0.614 ***	-0.644 ***	-0.691 ***	-0.670 ***	-0.611 ***	-0.775 ***	-0.698 ***
	-117	-116	-119	-81	-146	-143	-39	-77	-138
SIZE	5.482 ***	5.637 ***	6.948 ***	5.301 ***	5.383 ***	6.268 ***	4.961 ***	5.410 ***	6.170 ***
	96	97	142	79	118	166	47	61	122
TANGIBILITY	0.150 ***	0.192 ***	0.180 ***	0.137 ***	0.156 ***	0.156 ***	0.173 ***	0.191 ***	0.185 ***
	92	99	124	60	102	102	49	80	127
TAX				-0.029 ***	-0.007 ***	0.050 ***	-0.067 ***	-0.034 ***	0.051 ***
				-10.2	-3.5	27.1	-11.8	-11.3	22.5
RISK				0.079 ***	-0.013 ***	0.016 ***	0.095 ***	-0.046 ***	-0.023 ***
				13.8	-3.4	16.3	7.9	-5.2	-7.1
FSTS							0.007 **	0.018 ***	0.001
							2.2	8.5	1.2
Cross-sections	5918	8000	10212	4924	6724	9178	2008	3020	6511
Observations	27994	21084	42128	17872	14179	30488	6544	5935	17161
Adjusted R-squared	0.801	0.882	0.789	0.757	0.934	0.989	0.944	0.959	0.995
R-Square (Unweighted)	0.148	0.201	0.214	0.156	0.199	0.195	0.168	0.222	0.213

Note: This table reports estimated coefficients from the panel regression of leverage ratios in three separate time periods, prior to, during- and post-financial crisis periods. The regression model is the estimate generalized least squared panel regression model with cross-section weights (Panel EGLS with cross-section weights). All regression models correct for heteroskedasticity by engaging standard error adjusted for clustering at country, year, and industry dimensions (Petersen, 2009). All independent variables are explained in Table 10, and their descriptive statistics are showed in Table 11. T-statistics are reported below the estimated coefficients. Significant level of estimated coefficients at the 1, 5, and 10% levels are showed next to coefficients as ***, **, and *, respectively.

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Since size of samples varies significantly in each model, I will start with coefficients from the model with the most observations. In other words, the following section will calculate confidence intervals of estimated coefficients of MKB, ROA, SIZE and TANGIBILITY from model 1, and TAX and RISK from model 2. Moreover, I will repeat the confidence intervals of coefficients for model 3, since it is exclusively targeting internationalized EM firms. Table 19 shows confidence intervals for the determinant's coefficients prior to, during, and in the post global financial crisis periods. All confidence intervals are calculated at 95% confidence level[75]. If these bars do not overlap, then we can report statistically that the same determinant does not have the same degree of impact on firms' capital structure choices in different time. Only confidence intervals of determinants' coefficients from the best model[76] are shown in this section. MKB and ROA show different changing patterns in model 1 and model 2,[77] but these differences are due to new determinants (TAX and RISK) in model 2. Confidence intervals of determinants' coefficients in model 3[78] will be discussed separately in the later sections.

The empirical evidence from Table 18 and Table 19 suggests that all capital structure determinants used in this study are important for EM listed firms' leverage decisions, and their influences on firms' debt usage show changing magnitude due to the impact of the global financial crisis and its aftermath. Some of these changes indicate that impacts of EM firms' capital structure determinants on debt usages during the sample

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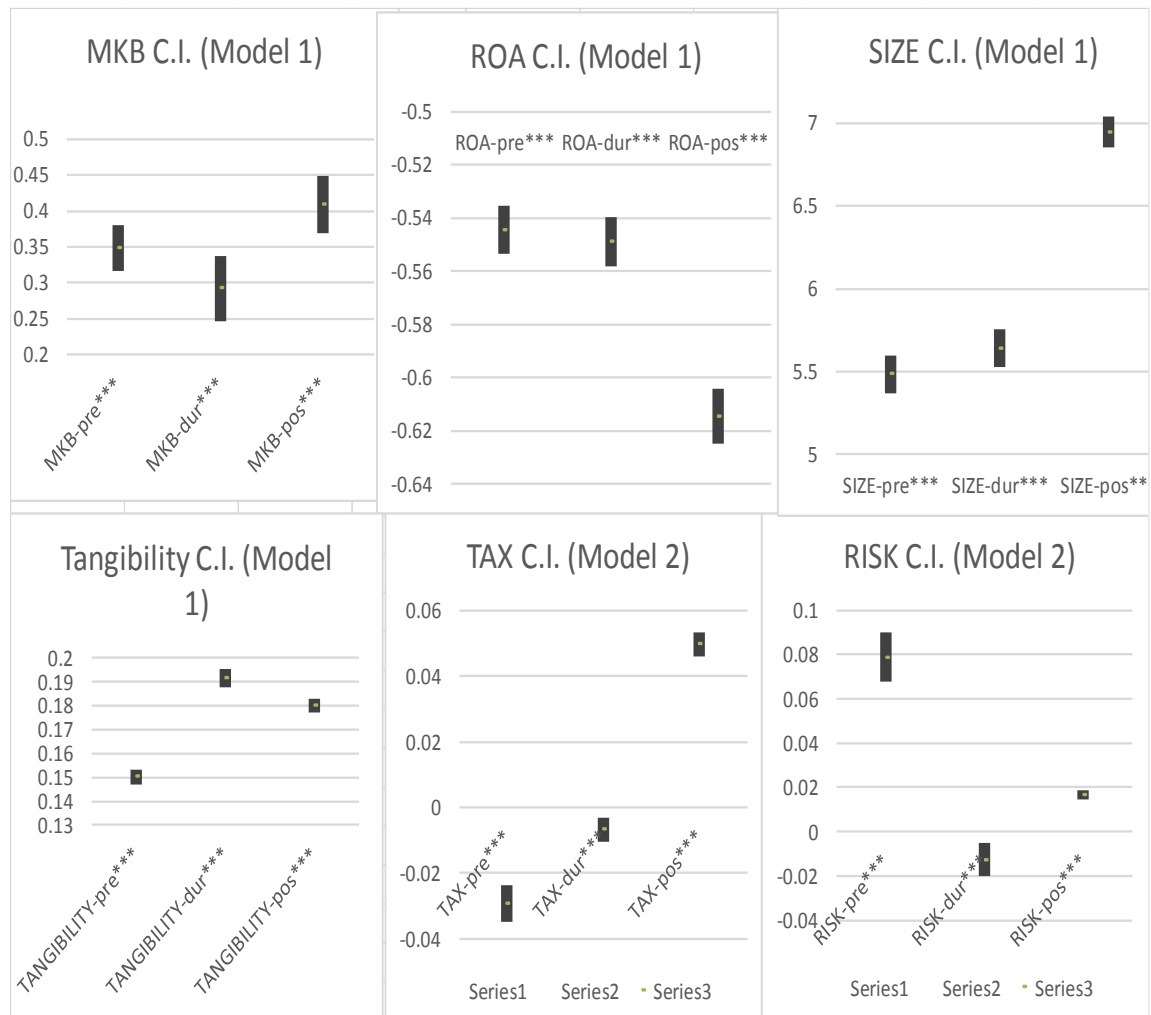[75] 95% confidence level means 5% significant level.
[76] Best model means the model with largest sample sizes.
[77] Results will be report in Appendix.
[78] Model 3 contains firms reported FSTS ratios.

period are approaching to impacts of DC firms' capital structure determinants on debt

usage, and providing better understandings of dynamics of these capital structure

determinants.

Table 19: Confidence intervals for determinants' coefficients for model 1 and model 2

Notes: Confidence intervals are manually calculated and plots. All confidence intervals
are calculated at 95% confident level. T-statistics are reported below the estimated
coefficients. Significant level of estimated coefficients at the 1, 5, and 10% levels are
showed next to coefficients as ***, **, and *, respectively.

Relationships between firms' growth and their leverage ratio in different time

periods show that firms' growth opportunities have the highest impact on firms' debt

usage in the post-crisis period. Although the magnitude of impact is in the minimum level

during the crisis period, there is no significant difference in terms of the magnitude

between the pre-crisis period and the during-crisis period[79]. Similar finding is also

recorded in capital structure study on US firms (Harrison and Widjaja, 2014) that the

impact of firms' market-to-book ratios on leverage were smaller during the crisis period

than the pre-crisis period. Table 13 shows that the impact of EM firms' MKB on leverage

was highest during the crisis period. During the crisis period, investors in developed

markets commonly chased higher returns and invested in equity markets within emerging

markets; thus, EM firms' equity value were positively affected. In other words, market-

to-book ratios of EM firms may not be the correct proxy for growth during the crisis

period due to abnormal investment pattern. During the crisis period, although business

environments of emerging markets were not impacted immediately, the credit situations

of emerging markets were affected due to creditors taking precautions for aftermaths of

the crisis. Thus, external debt would not be the preferred source of fund for EM firms

during the crisis period. This can be seen in Table 2 and 3 that average debt usage of EM

firms reduced during the crisis period. As a result, the impact of MKB on firms' debt

usage reduced during the crisis period is jointly caused by the abnormal investment

pattern of EM equity markets and constrained credit markets in emerging markets.

Despite the positive relationship between firms' growth and debt usage, this finding

partially supports the "market-timing theory" that firms would likely raise fund through

the over-price security. In addition, the impact of EM firms' MKB on debt usage reached

the highest level in the post-crisis period, when EM firms' equity values reduced to the

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[79] The 95% confidence intervals show slight overlap, but the 90% confidence intervals
(unreported) show no overlap.

similar level as in the pre-crisis level[80]. This finding is supported by the extra money

supply that created by after-crisis QEs. EM listed firms with higher equity value

rebalanced their debt-equity mixture with a new optimal capital structure in the post-

crisis period. In other words, the "dynamic trade-off theory" is partially supports that EM

firms maintain their debt usage in regard to their equity value movements over the sample

period.

EM firms' profitability (ROA) impact firms' leverage policies similarly between

the prior- and during-crisis periods. This finding is inconsistent with Harrison and

Widjaja (2014) that US firms' profitability showed smaller impact on debt usage during

the crisis period. This can be viewed as evidence that there is a delayed impact of global

financial crisis on EM firms' debt usage in respect of their profitability. This is mainly

due to that EM firms were mostly domestically oriented[81], and their profitability did not

show higher variations during the crisis period. The descriptive statistics of ROA[82]

support the view that EM firms' average profitability did not decrease until the post-crisis

period. In the post-crisis period, profitable firms will use significantly less debt than they

do in earlier periods. In the post-crisis period, aftermaths of the global financial crisis and

QEs influence emerging markets' both business and financial environments. Firms'

managers and creditors may have different interpretations on these adverse environments.

On the one hand, the extra money supply created by QEs provide more lending ability to

creditors. On the other hand, the adverse business environment limits EM firms' abilities

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[80] Table 13 shows that firms' MKB in the post-crisis period is lower than their pre-crisis level, and the standard deviation is also reduced in the post-crisis period.
[81] Table 13 shows that DOI (measured by FSTS) did not change significantly before the post-crisis period.
[82] Table 13 shows descriptive statistic of ROA.

to service debt. Asymmetric information problems are more severe during the post-crisis period than other periods. Thus, EM listed firms prefer to use internally generated funds, which is consistence with the "pecking-order theory" and the "agency theory."

The size of the firm and its asset tangibility are common proxies for asymmetric information problems. Larger firms (SIZE) have relatively more debt than smaller firms in all periods, but the magnitude is significantly greater in post-crisis periods than in earlier periods. In fact, there is insignificant difference between the magnitude of firms' size on firms' leverage level in the period between 2000 and 2009. On the contrary, firms' asset tangibility (TANGIBILITY) reflect significantly different influences on firms' debt usage choices across different times period. The magnitude of impact is greatest during the financial crisis while the magnitude of impact in the post-crisis period is higher than the magnitude of impact in the pre-crisis periods. This finding is similar to capital structure study on U.S. firms, which suggested asset tangibility became one of most important capitals structure determinants during the crisis period (Harrison and Widjaja, 2014).

According to Table 13, during the crisis period, EM firms' equity value were pushed higher than before, while their profitability did not experience significant fluctuation. In other words, the extremely high impact of firms' asset tangibility on debt usage can be interpreted as that EM creditors are taking precautions on new loan applications due to wide spread of credit shortage caused by the global financial crisis. This delayed effect of SIZE is similar to results on ROA during the crisis period. In the post-crisis period, even though impacts of firms' asset tangibility on debt usage remains important for creditors, sizes of firms become extremely crucial. These findings suggest

that creditors were more favorable to loan requests from larger firms and firms with higher asset tangibility than their smaller and lower asset tangibility counterparts. These findings support both the "pecking-order theory" and the "agency theory" that asymmetric information problems were greater in the post-crisis period than other periods, and creditors took precautions on loan inquiries with extremely high requirement on asset tangibility for EM firms during the crisis period.

Results of TAX show that the magnitude of tax payments' impacts on firms' leverage change from significantly negative[83] in the prior-crisis period to significantly positive in the post-crisis period, while such impact shows minor negatively impact on leverage during the crisis period. The negatively impact of firms' effective tax rate and debt usages in the period of 2000 to 2009 is consistent with previous capital structure studies on emerging- and developing-market firms (Booth et al., 2001; Fernandes, 2011). As suggested by previous literature, this finding suggests that effective tax rate is not a proxy for firms' debt tax-shield; instead, it is a proxy for firms' profitability.

Another explanation of this negative relationship can be explained by the combination of different factors. Emerging markets experienced strong growth during the period between 2000 and 2006, and listed EM firms were chasing the growth potential and they are market-driven. As a result, listed EM firms' investment decisions were mainly influenced by potential market shares and futures. The sources of capital for these investments should be a combination between retained earnings, debt, and equity.

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[83] In the whole sample period, the relationship between TAX and LEVERAGE is significantly positive.

However, due to the limitation on timings of earnings and unlikelihood that listed firms easily issue new equity, debt is essentially the best option to support their investments. Due to booming real sectors in the pre-crisis period, especially manufacturing industry[84], a relatively large portion of these investments were made to enlarge production capacity. In other word, listed EM firms made investments in fixed assets, and listed EM firms shows similar level of asset tangibility as previous study[85] (Fernandes, 2011). Fixed assets provide tax benefit through depreciation, which will create a downward pressure of firms' effective tax rates. Although the addition debt used for such investments also created debt tax-shield, the magnitude of debt tax-shield is commonly smaller than the magnitude of tax-shield on depreciation of fixed assets. To sum up, listed EM firms raised debt and made investments to explore market potential, and mainly invested in fixed assets to build production capacity, which created more tax-shield through depreciation. This dynamic system of negative correlation between firms' debt usage and effective rates is a synergy these sequence financial and business behaviors.

Furthermore, during the financial crisis, the negative correlation between firms' debt usage and effective rates is very close to zero. This explanation above still valid, but the effect was much weakening. The global financial crisis significantly impacted world trade and created excessive production capacity issues in emerging markets. Listed EM firms repealed investments on fixed assets[86] during the adverse environment, and tax

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[84] Manufacturing firms account for around 60% of the sample.

[85] Compare with previous study (Fernandes, 2011), the average firms' asset tangibility was 38.8% between 1990 and 2007, and Table 14 shows that EM firms' average asset tangibility was 37.4% between 2000 and 2006.

[86] The EM firms' average asset tangibility reduced from 37.4% in the pre-crisis period to 33.7% in the during-crisis period, according to Table 14.

benefit from depreciation declined overtime[87]. Thus, this small negative correlation between firms' debt usage and effective rates may be due to the residual effect from prior investment on fixed assets.

However, the changing dynamic of TAX indicates that emerging markets' financial institutions improved over time. The positive impact of firms' effective tax rates and debt usages in the post-crisis period suggests that EM firms took advantages of debt tax-shield to promote after-tax earnings. Moreover, this finding is consistent with the "trade-off theory," and it is a signal that optimal capital structure and optimal cost of capital became objectives for financial officers of EM firms. The possible explanation of this changing relationship between firms' debt usage and effective rates is a result of that listed EM firms changed their business and financial strategies to adapt adverse environments caused by the global financial crisis. Before the crisis, EM firms could make investment decisions based on high growth market potentials. The global financial crisis affected emerging markets and created excessive production capacity issues. To adapt these adverse environments, listed EM firms change their business model from market-driven to efficient-driven. The final investment decisions are no longer made with market potential and future growth, but made based on WACCs and net present values (NPVs) of new projects. Unlike the period before 2010, investment on fixed assets further declined[88]; thus, the tax-shield from depreciations also declined and became relatively negligible[89]. In other words, EM firms' debt tax-shield became the dominate factor that

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[87] Investments on fixed assets create tax-shield for a period of times with decreasing magnitude of sizes for every year's tax-shield.

[88] The EM firms' average asset tangibility in the post-crisis period is 32.5%, according to Table 14.

[89] Depreciation from fixed assets is commonly running on the modified accelerated cost recovery system (MACRS), so depreciable amounts decline overtime.

influence firms' effective rates, and EM firms consequently took advantage of debt tax-shield and promote their after-tax earnings.

Although both MKB and TAX supports the "trade-off theory," they show their support from two different ways. On the one hand, the positive effect of market-to-book ratios on debt usage throughout the sample period can be only interpreted as that EM firms are maintaining their debt-equity mixtures. On the other hand, the positive effect of firms' debt-tax shield on debt usage in the post-crisis period suggests that EM firms start to take debt tax-shield into account for their optimal weighted average cost of capital.

Firms' business risk (RISK) is a significant factor that firms consider while making capital structure decisions throughout the sample period. However, business risk has significantly different impacts on leverage in each of these three periods. The confidence intervals suggest that business risk had the largest positive impact prior the financial crisis over the other two periods while the magnitude drops to small negative during the crisis, and finally increases to a slightly positive level in the post-crisis period. In the pre-crisis period, the positive effect of firms' income volatilities on debt usages may be due to that EM firms generally experienced high growth rates and they used external debt to sustain such high growths. During the crisis period, although the magnitude of the negative relationship is very close to zero, the negative relationship between firms' income volatilities and debt usages supports both the "pecking-order theory" and the "agency theory". Income volatility is directly related to firms' uncertainty on both firms' internal and external factors. Firms with high income volatility generally have a difficult time to service their debt regularly; thus, creditors are less favorable to firms with high income volatility. Moreover, external environments, such as adverse environments

caused by the global financial crisis, have directly influences on creditors. During the crisis period, creditors routinely took precautions on nonperforming loans through imposing higher requirements on loan applicants.

However, this negative relationship between firms' income volatilities and debt usages during the crisis period was only a temporary relationship as part of precaution that creditors took, and such relationship changed back to positive in the post-crisis period. This positive relationship in the post-crisis period can be interpreted in two entirely different ways. Firstly, the positive relationship between firms' income volatility and debt usages can be interpreted as that income volatility is a proxy for firms' growth abilities. Secondly, this positive relationship may be caused by firms' performances not meeting expectations, and EM firms may have had to use additional debt to maintain their business operations in adverse environments. Despite the delayed effect on impacts of the global financial crisis on EM firms' capital structure determinants, the latter explanation is supported by capital structure studies on US firms during the financial crisis (Campello et al., 2010; Dang et al., 2014; Fosberg, 2012). Using a sample of US firms from 2002 to 2012, Dang et al. (2014) found constrained firms[90] have better ability to quickly adjust their capital structure than non-constrained firms during the pre-crisis period, as they rely on external financing in order to balance their massive financing deficits.

In addition, the RISK indicator is measured by standard deviation of firms' operating margins over last three years. In other words, firms' income volatilities in the

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[90] Constrained firms are defined as companies with high growth, significant investment, small size, and unstable earnings.

pre-crisis period may be treated as a proxy for firms' growth abilities. There is no capital structure theory that predicts the positive relationship between firms' income volatility and debt usages, and this relationship is in fact opposite to the "pecking-order theory" and the "agency theory," which state that asymmetric information and income volatility generally hold a positive relationship. Since results show that firms' income volatility is positively affecting debt usage in period prior the crisis and post the crisis, I re-run the regression model by employing an interaction term between firms' growth potential and income volatility to examine my argument, results are show in Table 20.

Table 20: *Regression model 2 with interaction term with pre-crisis and post-crisis periods.*

	Pre-crisis		Post-crisis	
MKB	0.282737	***	0.08755	***
	9.139155		3.559205	
ROA	-0.64529	***	-0.66823	***
	-81.2402		-136.358	
SIZE	5.289727	***	6.268693	***
	79.14071		156.5769	
TANGIBILITY	0.136838	***	0.156397	***
	60.23408		100.9828	
TAX	-0.02962	***	0.049042	***
	-10.4056		24.38979	
RISK	0.093608	***	0.004674	
	11.75538		1.189388	
MKB*RISK	-0.0039	**	0.005289	***
	-2.44146		3.619037	
Adjusted R-squared	0.777		0.999	
R-squared	0.156		0.195	
Cross-sections	4924		9178	
Observation	17872		30488	
Effect:				
Year Dummy	X		X	
Country Dummy	X		X	
Industry Dummy	X		X	

Results in Table 20 are generally similar to regression results in Table 18, but there are two main findings. In the pre-crisis period, the interaction term shows negative directional relationship with firms' debt usage. This finding suggests that income volatility is not an alternative indicator to measure firms' growth potential. This finding is consistent with both the "pecking-order theory" and the "agency theory" that income volatility should impact firms' debt usage negatively, and the negative impact progressively increase as firms' equity values go up. It is plausible that the positive relationship between firms' income volatility and debt usage may be due to that EM firms finance their additional financial distress through external capital, then their equity values would become an indicator for managers to decide how to raise these external funds. On

the contrary, results in the post-crisis model show that income volatility become insignificant to firms' debt usage decisions, but the interaction term is significantly positive affecting firms' debt usage decisions. Findings on relationships between firms' income volatility and debt usages suggest that EM firms and EM creditors have different understandings on income volatility comparing to their DC counterparts. Nevertheless, the minor negative correlation between income volatility and firms' debt usage during the crisis period suggests EM firms and EM creditors are moving into the right direction in the decision-making process.

To sum up, although Table 18 reports that EM listed firms with more growth options, have less profitability, larger size, more tangible assets, higher business risk, and higher tax payments, carry more debt between 2000 and 2014, their impacts on firms' debt usages show significant variations in different sub-sample periods. In the pre-crisis period, firms' effective tax rates and debt usages hold a negatively relationship, and rest determinants remain unchanged from the whole sample period. During the global financial crisis, impacts of the crisis did not show immediately effects on EM firms' debt usage decisions, but there is evidence that creditors took extra precautions on EM firms' assets tangibility and stable incomes in their debt inquires. Moreover, results show full support for the "pecking-order theory" and the "agency theory," and partial support for the "trade-off theory" and the "market-timing theory" between 2000 and 2009. In the post-crisis period, all capital structure theories except the "market-timing theory" are supported. EM firms are not only prioritized on internally generated funds, but also by maintaining optimal capital structures and costs of capital through debt tax-shield and ideal debt-equity mixture. The latter finding is similar to that Bancel and Mittoo (2004),

who supported that developed-country firms' capital structures can be explained by the "trade-off theory." Therefore, there is a financial policy convergence between both EM and DC firms.

On the contrary, creditors are more biased towards EM firms with larger sizes and moderately high levels of asset tangibility than their requirements on loans between 2000 and 2009. Findings in this sections also confirm that in the aggregate level, although the global financial crisis affected global business, credit and equity environments throughout the global, there are delayed effects in term of impacts on EM firms' debt usage decisions. However, findings listed above could not be applied to internationalized EM firms. Moreover, capital structure theories cannot provide an explanation on the insignificant relationships between firms' leverage and their taxes payments, nor between firms' leverage and their business risk shown in Model 3 from Table 18. These two results may be influenced by the sample period and aftermath of the global financial crisis. Calomiris et al. (2012) suggested that reduction in world trade due to the global financial crisis is the most influential element for EM firms. Therefore, internationalized EM firms have a better and earlier understanding of the global financial crisis than their domestically focused counterpart, and their funding decisions may be experienced different changes in response to the crisis. In other words, it is critical to exclusively focusing on the changing dynamics of internationalized EM firms' capital structure determinants.

Changing dynamics of capital structure determinants of Internationalized EM Firms

This section will solely focus on the confidence intervals of estimated coefficients in model 3, where internationalized EM firms are exclusively analyzed. Similar to Table 19, confidence intervals of model 3's estimated coefficients are reported in Table 21. I will mainly focus on the differences between Table 21 and Table 19, and identify the key different changing dynamics of internationalized EM firms' capital structure determinants.

Table 21: Confidence intervals for determinants' coefficients for model 3
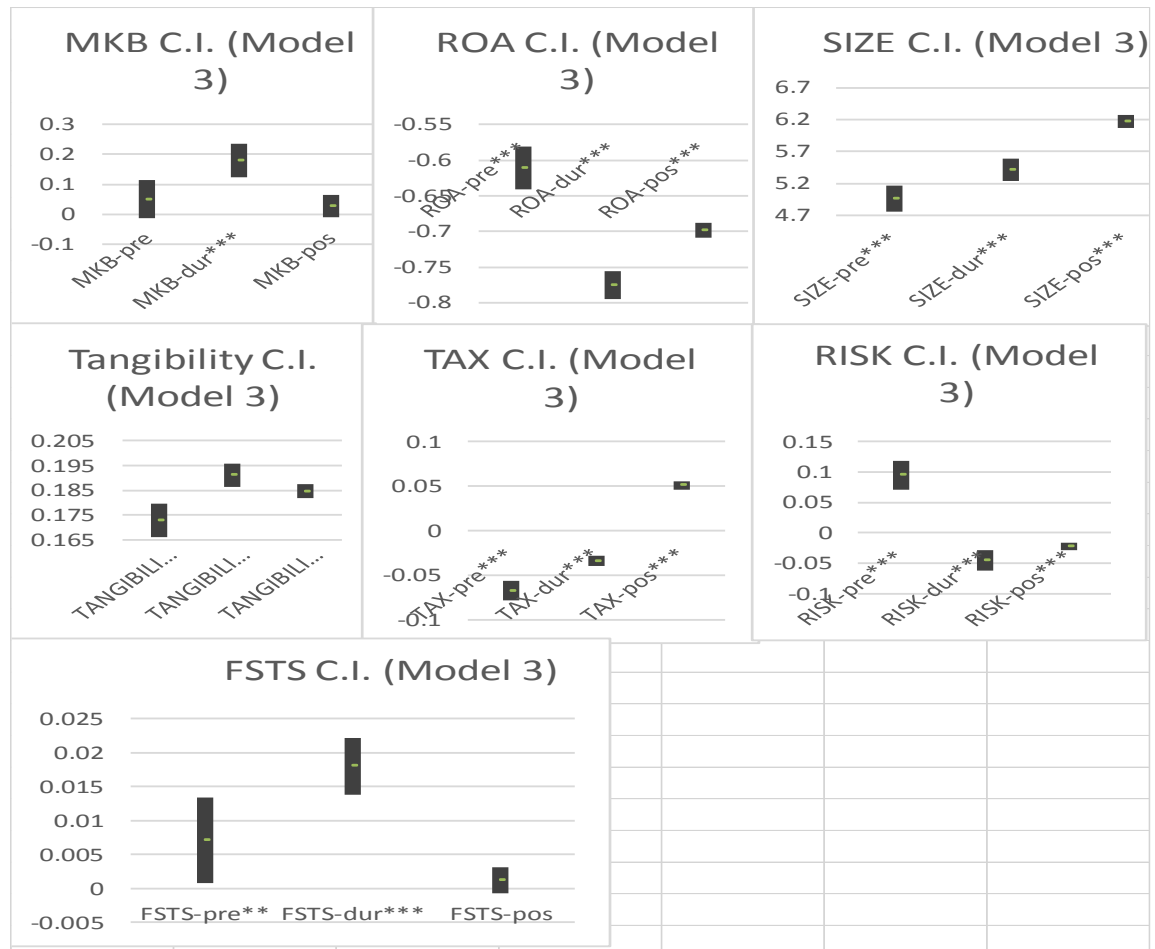
Notes: Confidence intervals are manually calculated and plots. All confidence intervals are calculated at 95% confident level. T-statistics are reported below the estimated coefficients. Significant level of estimated coefficients at the 1, 5, and 10% levels are showed next to coefficients as ***, **, and *, respectively.

Comparing Table 21 with Table 19, there are some substantial differences between debt usage decisions made by internationalized EM firms and the whole sample firms in different sample periods. Internationalized EM firms' debt usage decisions were not impacted by their growth options in both the pre- and the post-crisis period. In other words, firms' growth options influence firms' debt usage decisions positively only during the global financial crisis. These findings may be because emerging countries' equity markets are often less efficient than equity markets in advanced economies. EM equity value experienced high growth during the global financial crisis period[91]. Thus, EM listed firms mainly focused on market expansion prior the crisis, and their equity value went up as a consequence of market expansions. Although previous studies did not involve internationalized EM firms, previous capital structure literature on emerging markets also suggested that EM firms did not follow the original "pecking-order theory" and used equity as their last resort of funding sequences (Chen, 2004; Delcoure, 2007; Nivorozhkin, 2003). In other words, internationalized EM firms' market-to-book ratios may not be an appropriate proxy to measure the growth opportunities before and after the global financial crisis. Another explanation on the significantly positive relationship between internationalized EM firms' MKB and debt usages is that internationalized EM firms took advantage of high equity values during the crisis period and issued external debt. By doing this, they can maintain a similar level of debt-equity mixture and potentially reduce their weighted average cost of capital[92]. Therefore, the "trade-off

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[91] Table 13 shows that average market-to-book ratio of emerging-market firms is highest during the crisis period.
[92] When a firm's equity price increase, its amount of equity in market value term also increase. Since cost of equity is commonly higher than cost of debt, weighted average of cost of capital will also increase. If the firm issue additional debt, the

theory" is only supported for internationalized EM firms during the global financial crisis.

The impact of profitability on internationalized EM firms also shows differently in both magnitude and dynamic comparing with the overall sample. Table 21 shows that internationalized EM firms' profitability has an impact on their debt usage in higher magnitudes than results in Table 19. Thus, the preference to use internally generated funds is higher for internationalized EM firms than domestically oriented EM firms. This is mainly due to asymmetric information, as suggested by both the "pecking-order theory" and the "agency theory." In addition, profitability is also showing the ability that a firm can service their debt. In the adverse environment, creditors typically demand higher requirements on firms' profitability for their debt. On the contrary, internationalized EM firms experienced immediate impacts from the global financial crisis, and they are conservative on acquiring external debt by switching their capital needs more aggressively from internally generated funds. In the post-crisis period, the impact of profitability on internationalized EM firms in magnitude is in between the pre-crisis and the during-crisis period. This finding is unsurprising that internationalized EM firms took advantage of the global financial crisis and further expand their market reach in the global arena[93], as these expansions generally require additional capital investments for both working capital and capacities. Thus, firms' preference to sustain their growth through internally generated fund slightly switch to external capital, while other criteria would carry more weights by creditors for a firm's loan applications.

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[93] Table 13 shows that degree of internationalization of emerging-market firms increased significantly in the post-crisis period.

While profitability is a proxy for asymmetric information, both size and asset tangibility are direct criteria for creditors to evaluate firms' collateral. The impact of sizes of internationalized EM firms on debt usages shows lower delayed effects than results reported in Table 19. The importance of size of the firm on its debt usage increases progressively over time. Firms' asset tangibility carries the similar impact on debt usage as reposted by the whole sample, both in term of magnitudes and changing patterns. These findings are consistent with previous studies that asymmetric information and transparency problems and firms' internationalization are positively correlated (Bartov et al., 1996; Burgman, 1996; Chen et al., 1997; Doukas and Pantzalis, 2003; Lee and Kwok, 1998; Mansi and Reeb, 2002b; Mitoo and Zhang, 2008). Thus, similar to Table 19, both the "pecking-order theory" and the "agency theory" are supported by internationalized EM firm.

Internationalized EM firms' tax payments[94] were negatively influenced firms' usage of debt between 2000 and 2009. After the global financial crisis, the relationship between firms' debt usages and tax payments became positive. These findings are also similar to findings on TAX in Table 19. Due to these opposite effects, it is unsurprising that EM firms' tax payments do not impact their leverage decisions in the whole sample period. This finding can be explained by that the effective tax rate is a proxy of a firm's profitability[95] before 2010; thus, this negative correlation between firm's tax and leverage is partially supported by the "pecking-order theory" that profitable firms use less debt. An

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[94] Firms' tax payment is a proxy to measure firms' debt tax-shield.
[95] Firms' profitability is negatively impacted by their tax payments. As firms' profitability decline, the ability they can serve their debt also decline. Thus, the relationship between firms' tax payments and their leverage decision is expected to be negative.

alternative explanation of this negative correlation between firms' debt usages and effective tax rates is based on discussion on the whole samples above. There is a dynamic system for creating such negative correlation, and the dynamic system is associated with growth conditions of economies and international trade, investments to expand production capacities, depreciations and their tax-shield from newly installed fixed assets.

On the contrary, the positive relationship between firms' leverage and tax rate in the post-crisis period supports the "trade-off theory". Companies use tax shields to promote after-tax income. In other word, firms constantly adjust their level of debt[96] in order to achieve their target capital structure and cost of capital. Unable to make funding decisions in the post-crisis period with growth potentials, EM firms make investment decisions exclusively based on cost of capital. This is similar to discussion on the relationship between EM firms' debt usage and effective tax rates in the whole sample firms. The debt tax shield is a key element that affects the cost of debt, and from this, a firm's leverage decisions are also directly affected by the firm's debt tax-shield.

According to Table 18, business risk is not a determinant of leverage in model 3 with internationalized EM firms. All sub-sample models show significant relationship between leverage and business risk. Prior to the crisis the relationship was positive followed by an after crisis negativity. The positive relationship prior to the crisis is inconsistent with capital structure theories that companies with higher income volatility should not use more debt than their less volatile counterparts. In addition, firms would simply demand more capital to finance their growth opportunity[97]. Moreover, market-to-

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[96] Firms adjust their level of debt in order to adjust their capital structure.
[97] Business risk is measured by the standard deviation of firms' operating margins in the previous three years. It does not differentiate profitability increase and decrease.

book ratios provide an insignificant connection between EM firms' growth opportunities and their leverage. Thus, testing the interaction term between firms' MKB and RISK would not be sensible[98]. Similar to Table 21, the risk indicator may be an alternative measure for firms' growth opportunities in the pre-crisis period. It can be also explained as that internationalized EM firms raise external debt to survive the unfavorable situations.

Contrastingly, the negative relationship between firms' leverage and business risk during and after the global financial crisis supports the "pecking-order theory" and the "agency theory" that a firm would not raise more debt if the firm is experiencing high income volatilities and asymmetric information problems. The global financial crisis initially created an adverse economic environment across the globe. EM firms' operating margin usually experienced slow growth or even negative growth under the adverse economic environment, regardless of their degrees of internationalization. Furthermore, to recover from recession, developed markets initiated QE programs to increased money supply. The additional money supplies simultaneously flushed into emerging markets and levered up significantly (Wheatley & Kynge, 2015). Despite how EM firms experienced a reduction in growth, they took advantage with the extra money supply to finance their growth. In other words, the negative relationship between EM firms' leverage and business risk in the post-crisis period may be because creditors will often raise their lending requirements to compensate these additional potential risks.

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[98] Interaction term can be only introduced if both independent variables are significant in the original model.

Lastly, firms' degree of internationalization (FSTS) is a significant factor in firms' leverage decision, excluding the period after the global financial crisis (2010 – 2014). Regardless of the insignificant relationships after the crisis periods, the degree of internationalization has significantly larger impacts on leverage during the financial crisis period than in the pre-crisis period. EM firms' initial foreign expansions commonly demand external capital due to additional costs on working capital and foreign distribution channels. Thus, EM firms used more debt prior to the crisis period in their foreign expansion. The increased impact of DOI on firms' leverage can be explained by that EM listed firms utilizing more external debt to take advantage of high equity values. In other words, the degree of internationalization in both the pre-crisis and the during-crisis periods may be an alternative measurement for firms' true growth potential.

In addition, growth opportunities[99] did not show any significant impact on debt usage in the pre-crisis and the post-crisis periods, but it is a significant determinant during the crisis period. Therefore, this gave me the opportunity to examine the argument that DOI and MKB are both measuring firms' growth potential during the crisis period[100]. I introduce an interaction term with both MKB and DOI into the regression model 3 during the crisis period, and the results are reported in Table 22.

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[99] Growth opportunities are measured by firms' market-to-book ratios (MKB).
[100] Interaction term requires both independent variables to be significant in the original model. Since MKB is insignificant in the pre-crisis period and FSTS is insignificant in the post-crisis period, I can only use interaction term with both variables in the during-crisis period.

Table 22: *Regression model 3 with interaction term during the crisis period (2007 – 2009)*

MKB	0.2026	***
	7.580728	
ROA	-0.7745	***
	-75.8871	
SIZE	5.432117	***
	62.84183	
TANGIBILITY	0.190598	***
	79.66916	
TAX	-0.03387	***
	-11.6015	
RISK	-0.04579	***
	-5.30859	
FSTS	0.020226	***
	8.402755	
MKB*FSTS	-0.00117	**
	-2.00666	
Adjusted R-squared	0.965	
R-squared	0.222	
Cross-sections	3020	
Observation	5925	
Effect:		
Year Dummy	X	
Country Dummy	X	
Industry Dummy	X	

Results reported in Table 22 are similar to the results of Model 3 during the crisis period, depicted in Table 18. While both MKB and FSTS show a significantly positive relationship with EM firms' debt usages, the interaction term shows a significantly negative relationship with EM firms' debt usages. This finding suggests that EM firms with both high growth options and high level of foreign sales will not use more debt than EM firms with high growth options or a high level of foreign sales. When EM firms have high market-to-book ratios, their shareholders have confidence on the future of firms.

Asymmetric information problems and firms' internationalization hold a positive relationship. Thus, when internally generated fund is not enough and other firms' indicators remain constant, internationalized EM firms with both higher MKB and higher internationalizations are biased to equity-financing instead of debt-financing. Contrastingly, internationalized EM firms with lower FSTS and higher MKB and Internationalized EM firms with higher FSTS and lower MKB are biased to debt-financing. The former is consistent with the "pecking-order theory" and the "agency theory" that firms' internationalization and asymmetric information hold a positive relationship (Bartov et al., 1996; Burgman, 1996; Chen et al., 1997; Doukas and Pantzalis, 2003; Lee and Kwok, 1998; Mansi and Reeb, 2002b; Mitoo and Zhang, 2008). The latter is suggested by the "market-timing theory" that firms should issue equity to raise money if their equities are overvalued. Therefore, during the global financial crisis, EM firms' degree of internationalization is not an alternative indicator to proxy firms' growth.

In the post-crisis period, once firms' internationalizations are established, their foreign projects should provide new cash flows and gradually reduce firms' needs on external capital. This explanation is based on the "pecking-order theory"[101]. Thus, EM firms' further foreign expansions did not require as much external capital as their earlier foreign expansions. In addition, EM firms are more commonly engaging internationalization through exporting price-competitive products than developed market firms. Although EM firms were more sensitive to the reduction in world trade caused by

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[101] Foreign generated cash flows increase retained earnings, thus reduce firms' need for external capital.

the global financial crisis than DC firms (Calomiris et al., 2012), these price-competitive products are less impacted by the aftermath of the global financial crisis due to price inelasticity. EM firms' DOI shows significant increase in the post-crisis period. If the economic of scale is the only way to achieve profitability for these price-competitive exports, it is reasonable that EM listed firms did not enjoy higher profitability during the post-crisis period even when their foreign sales increase significantly. This finding along with a decreased profitability over the same period suggests that EM listed firms did not benefit from internationalization in term of profitability in the post-crisis period. This is supported by Luo and Tung (2007), they argued that the main objective for EM firms to internationalized is to acquire strategic resources and to reduce domestic constraints due to home immature institutions. This argument is also supported by the insignificant relationship between the growth potential of internationalized EM firms and their debt usages. They also suggested that EM firms engaged in internationalization is to build competitiveness against DC firms in both in their domestic and foreign markets. Thus, profitability is not the first priority when EM firms internationalized. This means that creditors and managers are less likely to finance their internationalization through external debt, especially in a time when financial and business environments were distorted by the global financial crisis.

Robustness Check

In term of the robustness of the model, the profitability measurement in this paper is ROA, which is calculated as net income divided by total assets. Although there is a very low correlation between leverage and ROA and between size and ROA[102], a firm's debt will affect its interest payments and eventually affect its net income, while firms' ROA is affected by the market value of firms' total asset[103]. Thus, firms' ROA is directly affected by firms' leverage level. Moreover, the tax indicator is calculated by using taxes paid divided by pre-tax income, and taxes paid may be affected if firms defer their tax payments. In addition, foreign sales to total sales ratio (FSTS), foreign assets to total assets ratio (FATA), and foreign employees to total employees (FETE) are three common measures for DOI. To avoid these issues, I use return on invested capital (ROIC)[104] as an alternative measure for profitability, adjust changes in deferred taxes with taxes paid and manually recalculate the effective tax rate indicator, and use FATA as an alternative measure for DOI. The results[105] are similar with ROIC and new tax indicator; thus, our model is robust.

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[102] See appendix 1.
[103] Market value of a firm's Debt and equity have direct impact on firm's total assets.
[104] ROIC is measured by net operating profits after taxes (NOPAT) divided by invested capital. Invested capital is calculated by total assets – non-interest bearing current liabilities – free cash flow.
[105] The result is available upon requested.

Conclusion

In search of the association among EM firms' debt usage decisions, capital structure determinants, degree of internationalization, and the impact of the global financial crisis, 10,861 firms from 22 emerging markets during 2000 – 2014 period are examined. This study is not only complements to previous capital structure literature on EM firms (Booth et al., 2001; Fan et al., 2012; Fernandes, 2011), but this study also exclusively focuses on EM firms' debt usage decisions in light of the global financial crisis and firms' internationalization. Unlike the Asian financial crisis, Fernandes (2011) reported that emerging- and developing-market firms' leverage usage dropped by over 10% between 1997 and 2007. In this study, at the aggregate level, average leverage ratios of EM firms slightly decreased over the sample period, while there are similar numbers of firms that experienced reduction in debt usage and increase in debt usage when comparing their pre-crisis average leverage ratios and post-crisis average leverage ratios. In addition, EM firms expanded repeatedly into the global arena, and their average proportions of foreign sales as total sales increased nearly 10% over the sample period. This study aims to explore how EM firms managed their leverage policy during the adverse environments imposed by the global financial crisis. Binary logistic regression and panel regressions are used in this study to identify EM firms' capital structure determinants. I split the sample period into three sub-sample periods: the pre-crisis period (2000 – 2006), the during-crisis period (2007 – 2009) and the post-crisis period (2010 – 2014). Confidence intervals of estimated coefficients in sub-sample periods are also

deployed and compared to identify the changing dynamic of EM firms' capital structure determinants.

The binary logistic regression shows that firms' growth potential, profitability, size, asset tangibility and institution-specific factor on nations' credit-market depths in the pre-crisis period influence EM firms' post-crisis decisions on their level of debt usage. Fernandes (2011) suggested that institutional factors dominated EM firms' leverage decisions prior to the Asian financial crisis, and institutional factors gradually tranferred to firm-specific indicators. Findings on the binary logistic regression suggest that EM firms' leverage determinants have changed, and firm-specific indicators become dominant factors for debt usage decisions made by EM firms.

In study on EM firms' leverage policy determinants, the panel regressions suggest that EM listed firms with more growth option, have less profitability, larger size, more tangible assets, higher business risk, and higher taxes, can carry more debt. In term of internationalized EM firms' leverage policy determinants, results suggest that there is a positive relationship between firms' degree of internationalization and debt usage. Other determinants show similar directional impact as regressions on whole sample firms except both taxes and business risk does not impact internationalized EM firms' debt usage. Previous capital structure studies on EM firms commonly suggested that the "pecking-order theory" is more suitable for EM firms (Booth et al., 2001; Chen, 2004; Fernandes, 2011; Nivorozhkin, 2003). This study supports that the "pecking-order theory" that EM firms would avoid asymmetric problems that firms would prioritize on internally generated fund, and firms' debt usages hold a positive relationship with firms' size and asset tangibility. In addition, this paper also finds support on the "trade-off

theory" that EM firms balanced their debt-equity mixture as their equity values change and firms' debt tax-shield also promote debt usage. To the best of my knowledge, the latter finding is the first time that a capital structure study on multi-EM firms supports the "trade-off theory". The "agency theory" is also supported that internationalized EM firms use additional debt to align objective and mitigate agency problems between foreign and top management teams.

In studies on the changing dynamic of EM firms' test, on capital structure determinants associated with the global financial crisis, suggest that EM firms' debt usage decisions were made differently in terms of the magnitude across different time periods. During the global financial crisis (2007 – 2009), creditors took precautions on the adverse environments by demanding higher requirement on firms' asset tangibility and income volatility for EM firms in their loan applications. Between 2000 and 2009, both the "pecking-order theory" and the "agency theory" are supported, while the "trade-off theory" is only partially supported because of the positive relationship between firms' equity values and debt usages. Moreover, the global financial crisis has a delay effects on impacting EM firms' leverage policy due to that emerging markets did not impact by the crisis immediately. In the post-crisis period, all three capital structure theories mentioned above are supported. EM firms use their internally generate funds more aggressively, and chase the optimal cost of capital through maintaining the benefit of debt tax-shield and ideal debt-equity mixture. On the contrary, creditors show preferences to EM firms with larger sizes and moderately high levels of asset tangibility than their preferences on loans between 2000 and 2009.

In addition, internationalized EM firms shows very different changing patterns on their leverage policy determinants. Since Calomiris et al. (2012) suggested that EM firms are mainly impacted by the reduction of world trade due to the global financial crisis, there is no delay impacts of the crisis in internationalized EM firms leverage policy determinants. All firm-specific factors show different magnitudes of impacts on internationalized EM firms' debt usages in all sub-periods. During the financial crisis period, internationalized EM firms' growth potential, profitability, asset tangibility, income volatility and degree of internationalization carry the highest impact on firms' debt usages. On the contrary, in the post-crisis period, both internationalized EM firms and firms in the whole sample show similar changing patterns on capital structure determinants with a few exceptions. The income volatility remains in a negative relationship with internationalized EM firms' debt usage in the post-crisis period. Moreover, there is no relationship between internationalized EM firms' growth opportunities and debt usages, and between firms' degree of internationalization and debt usage in the post-crisis period. The former finding is supported by Luo and Tung (2007) that main objectives of EM firms' internationalization is to acquire strategic resources and to reduce domestic constraints due to home immature institutions. The latter finding suggests that internationalized EM firms' foreign operations can self-support their future foreign expansions. Internationalized EM firms' leverage policy determinants in sub-sample studies show full support on the "pecking-order theory" and the "agency theory", and the "trade-off theory" is only partially supported due to insignificant relationship between internationalized EM firms' growth potential and debt usages.

Limitations

In process of performing this research, one limitation was that I only incorporate data from emerging-market public-listed firms. Emerging-market public and privately firms have different funding channels. Thus, findings in this paper can only explain capital structure determinants of emerging-market public listed firms. Moreover, different emerging markets experienced different changes in economy and institutional environments during the sample period. Therefore, findings in this paper apply to emerging-market listed firms' capital structure in aggregate level, and findings should be treated with cautions for listed firms in individual emerging market.

In addition, due to individual emerging market's regulations, investors' investment options are different across emerging markets, which potentially affects some capital structure determinants across the sample. For example, not all emerging markets investors can invest corporate bonds, and equity investment is the only option to invest listed companies for many of them. In other words, listed firms' total assets are only changed due to stock markets' fluctuation, and market value of debts do not change regularly. This may be explained that emerging-market firms' average debt usages vary significantly across nations[106]. Moreover, capital structure determinants used in model 1 are also affected in this regard. Firms' market-to-book ratios can be still interpreted as firms' growth opportunities, but they may not provide the same amount of explanatory power as a proxy for firms' growth opportunities across different emerging markets due to investors' investment channels. Similarly, profitability, asset tangibility and total assets are all affected in the same way.

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[106] Table 2 shows emerging-market firms' debt usage across countries.

Future Recommendations

In this paper, I focus on the capital structure determinants of listed EM firms. This paper can potentially inspire many area of future research. The sample contains 10,861 firms from 22 emerging markets and 9 different industries. Table 2 and Table 3 show there are some variations among different countries and industries, and manufacturing firms dominate the sample with 6,221 firms. Since the global financial crisis impacted different countries and industries in different speed and magnitudes, it is important to explore different changing patterns of leverage policy determinants with narrowly defined sample groups.

Another perspective of future research is to study EM listed firms' leverage policy by controlling their initial leverage level. Table 8, 9, and 10 show numbers of firms in different leverage categories that experienced changes in leverage in term of percentage changes of their average leverage ratio in the pre-crisis period. Different levels of firms' initial leverage usages not only influence asymmetric information and agency cost problems, but they also influence firms' financial distress and ability to handle additional debt. Therefore, future researches can exclusively focus on low, mid, and high leverage categorized EM listed firms' changing dynamics of their leverage policies, respectively.

In addition, this study does not differentiate maturity status of EM firms' debt. During the crisis period, listed EM firms' preferences on long-term debt or short-term debt remain unexplored. Although firms' preferences on debts' maturities are directly relatedly to specific capital projects, impacts of external factors imposed by the global financial crisis and QEs may be influencing EM firms' leverage policies. Therefore, explore the changing dynamic of listed EM firms' debt structures and their determinants

during the challenging time period can complement this paper for both managers and creditors.

Lastly, the global financial crisis and its aftermath have different level of impacts on privately held EM firms and publicly traded counterparts. Whether private EM firms are funding differently than listed EM firms, and how these results are different in various sample period, are also areas that require further exploration. I leave these for future research.

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Appendixes

Appendix 1: Correlation between variables

Correlation	LEVERAGE	MKB	ROA	SIZE	TANGIBILITY	TAX	RISK	FSTS
LEVERAGE	1.000							
MKB	-0.046	1.000						
ROA	-0.206	0.318	1.000					
SIZE	0.163	0.120	-0.027	1.000				
TANGIBILITY	0.245	-0.104	-0.043	0.068	1.000			
TAX	0.088	-0.056	-0.256	-0.079	0.027	1.000		
RISK	-0.012	0.011	-0.003	-0.057	-0.016	0.001	1.000	
FSTS	-0.046	-0.027	-0.029	0.142	-0.082	-0.075	-0.044	1.000

This correlation is calculated from Eviews.

Appendix 2: Principal component analysis result

Correlations between institutional indicator for financial sector

		Liquid	Privatebybank	Privatebybankandins	Financial	Stockcap	Stocktraded
Liquid	Pearson Correlation	1	.848	.743	.157	-.001	-.107
	Sig. (2-tailed)		.000	.000	.000	.948	.000
	N	9356	9356	9356	9356	9356	9356
Privatebybank	Pearson Correlation	.848	1	.926	.358	.186	.287
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	9356	9356	9356	9356	9356	9356
Privatebybankandins	Pearson Correlation	.743	.926	1	.364	.477	.373
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	9356	9356	9356	9356	9356	9356
Financial	Pearson Correlation	.157	.358	.364	1	.535	.264
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	9356	9356	9356	9356	9356	9356
Stockcap	Pearson Correlation	-.001	.186	.477	.535	1	.362
	Sig. (2-tailed)	.948	.000	.000	.000		.000
	N	9356	9356	9356	9356	9356	9356
Stocktraded	Pearson Correlation	-.107	.287	.373	.264	.362	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	9356	9356	9356	9356	9356	9356

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.093	51.554	51.554	2.611	43.510	43.510
2	1.533	25.548	77.102	2.015	33.591	77.102
3	.792	13.199	90.301			
4	.487	8.115	98.416			
5	.083	1.380	99.796			
6	.012	.204	100.000			

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component	
	1	2
Liquid	.964	-.117
Financial	.201	.718
Privatebybank	.948	.247
Privatebybankandins	.859	.447
Stockcap	.058	.847
Stocktraded	.031	.713

Extraction Method: Principal Component Analysis.

Rotation Method: Quartimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.831	.556
2	-.556	.831

Extraction Method: Principal Component Analysis.

Rotation Method: Quartimax with Kaiser Normalization.