

Corporate Debt Expansion in Emerging Countries after 2008: Profile, Determinants and Financial Stability Implications

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Abstract

This study aims to explore corporate debt expansion in emerging countries after 2008 crisis, presenting its profile, main determinants and financial stability implications. First, it is presented the features of emerging market corporate debt after 2008, with the growth of leverage, net foreign exchange exposure, later leading to deterioration in debt repayment capacity. Next, we do a panel regression to identify the main changes in the determinants of emerging market corporate debt expansion before and after 2008 crisis. Our analysis suggests that the exchange rate has been one of the most important determinants through the period 2000-2016, and also in the period before 2008. But after 2008, beyond some country level factors (exchange rate, national GDP growth, firms higher liquidity levels), other factors that have global origins (more accommodative monetary policy stance in USA, lower financial market volatility, higher commodity prices, global GDP growth) have become increasingly important. One of our contributions is to identify a factor not previously emphasized in the literature which investigates the determinants of corporate debt in emerging economies: the interaction between higher commodity prices and more appreciated exchange rates. Combined with an international scenario particularly uncertain, this raising indebtedness generated financial stability concerns. Those concerns would be better addressed if emerging countries and international institutions took additional initiatives, such as an improvement in the regulatory/supervisory framework and coordinated macro and micro-prudential measures, in order to enhance these countries resilience against financial crises.

Keywords: corporate debt; emerging countries; financial stability

Resumo

O objetivo deste estudo é analisar a expansão da dívida corporativa em países emergentes após a crise de 2008, apresentando seu perfil, principais determinantes e implicações para a estabilidade financeira. Primeiramente, apresenta-se as características da dívida corporativa em países emergentes após 2008, com o crescimento da alavancagem e exposição cambial líquida, com posterior deterioração na capacidade de pagamento das firmas. Em seguida, realizamos uma regressão em painel para identificar as principais mudanças nos determinantes da expansão da dívida corporativa antes e depois da crise de 2008. Nossa análise sugere que a taxa de câmbio foi um dos determinantes mais importantes durante o período 2000-2016, e também no período antes de 2008. Porém após 2008, além de alguns fatores em nível nacional (taxa de câmbio, crescimento do PIB doméstico, maior nível de liquidez das firmas), os fatores com origens globais (política monetária mais acomodatória nos EUA, menor volatilidade no mercado financeiro, preços mais altos de commodities, crescimento do PIB global) tornaram-se progressivamente importantes. Uma de nossas contribuições é identificar um fator não enfatizado previamente na literatura que investiga os determinantes de dívida corporativa em economias emergentes: a relação entre preços mais altos de commodities e taxas de câmbio mais apreciadas. Somado a um cenário internacional particularmente incerto, o crescimento deste endividamento traz preocupações relacionadas à estabilidade financeira. Estas preocupações seriam mais bem combatidas se economias emergentes e instituições internacionais tomassem iniciativas adicionais, no sentido de uma melhoria no arcabouço regulatório/de supervisão e medidas micro/macro prudenciais coordenadas, de modo a aumentar a resiliência destes países contra crises financeiras.

Palavras-Chave: dívida corporativa; países emergentes; estabilidade financeira

JEL: F34, F65, G32

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1. Introduction

Private debt ratios, especially of non-financial firms, have grown considerably since the 2000s, in advanced (AEs) and emerging economies (EMEs). However, the 2008 global financial crisis marked a tipping point for both group of countries. In advanced economies, corporate debt levels generally peaked in 2008. In the post 2008 period, after a limited downward adjustment, corporate debt ratios continued at high levels, and in some countries actually increased, according to OECD (2017). Conversely, emerging economies corporate debt levels increased since the 2000s from lower levels than AEs. But the 2008 crisis did not interrupt this trend, with EMEs corporate debt levels continuing to increase up to 2016. The post 2008 crisis period was marked by a development of international debt markets, with bond issuance growth (especially in foreign currency), coupled by an unprecedented monetary expansion in advanced economies, that eased international financial conditions, lowered risk spreads and increased search for yield, in particular for bonds of those countries.

However, this expansion in EMEs corporate debt started to be challenged by recurrent episodes of volatility in international debt markets: in 2013, the “taper tantrum” in USA; in 2014, the fall in commodity prices (especially oil/minerals); in 2015, uncertainties in China’s foreign exchange/stock markets; in 2016, after the election of the new US president. Beyond difficulties posed by the international economic scenario, EMEs companies face challenges related to currency mismatch (i.e. deficiencies in hedging); susceptibility to the interests of creditors/ institutional investors/ banks and macroeconomic volatility, which may put into question the financial sustainability of these companies. Moreover, although in recent decades several sovereign macroeconomic lines of defense have been developed to shield national governments from external shocks (e.g. flexible exchange rates; international reserves accumulation; currency swap agreements; development of local currency sovereign debt markets), the capacity of such lines to fulfill private firms’ needs in those occasions is uncertain, due to the mentioned problems. Hence, the increase in EMEs corporate debt size (even after 2008 crisis), the changes in its profile/determinants and the financial stability concerns associated to it raised attention to this issue, which deserves a deeper analysis.

Therefore, this study main objective is to discuss the increase in corporate debt in emerging countries after 2008, aiming to understand the changes in its profile, its determinants, and its financial stability implications. The article is structured as follows. After this introduction in section 1, section 2 presents the main features related to the amount/ profile of corporate debt expansion in emerging economies. Some of the main features of this expansion in EMEs corporate debt were the increase in leverage, net foreign exchange exposure, later leading to a deterioration of debt repayment capacity in a significant share of them.

In section 3 we do a literature review on theoretical approaches that underpin debt expansion in corporations and its features, including agents’ procyclical behavior. We observe that those approaches that have been well described both in the mainstream and heterodox literature, related to concepts such as the risk-taking channel of monetary policy, herd behavior and financial instability hypothesis. We also undertake a literature review on empirical articles that seek to understand the determinants of corporate debt in emerging economies.

In section 4, it is presented our own panel analysis to explain the main determinants that were behind this debt expansion. Our contribution in this literature is to investigate the determinants of EMEs corporate debt expansion by using a dataset which goes from 2000 Q1 up to a more recent period (2016 Q4), and with subsamples before and after the 2008 crisis, so we identify the main changes in the factors that explain EMEs corporate debt expansion before and after this event. Among them, a factor which was not previously used in the literature with that purpose: the interaction between higher commodity prices and more appreciated exchange rates. Our findings suggest that the exchange rate has been one of the most important determinants that explain the increase in EMEs companies' debt expansion through the period 2000-2016, and also in the period before the 2008 crisis. But after 2008, beyond some country level factors (exchange rate, national GDP growth, firms higher liquidity levels), other factors that have global origins (more accommodative monetary policy stance in USA, lower financial market volatility, higher commodity prices, global GDP growth) have become increasingly important to explain emerging market corporate debt expansion.

Section 5 closes the study with the final considerations and conclusions, discussing the financial stability implications of this debt increase, and the need to enhance regulatory/supervisory framework and implement micro/macprudential measures (preferably on a coordinated way), in order to improve the resilience against financial crises.

2. Features of Corporate Debt in Emerging Countries

This section presents the main features of the evolution of corporate debt in emerging economies in the recent period, with a special focus on non-financial companies.

Regarding the evolution of non-financial corporate debt in emerging countries, its amount rose from US\$ 9 trillion in March 2008 to US\$ 25.7 trillion in December 2016, according to BIS data (2017). Considering these values as percentages of countries' GDPs, growth between March 2008 and December 2016 was on average 41 percentage points (pp.), from 61% to 102% of GDP. In geographical terms, this increase occurred in all major regions that group emerging countries: Asia, Latin America, Emerging Europe, Middle East and Africa - EMEA. However, this expansion did not occur homogeneously: in Hong Kong and China, the increase in non-financial corporate debt in the period was 82 pp. and 69 pp. respectively, to levels above 166% of GDP. Chile, Turkey and Singapore also had significant increases of 38, 34 and 31 pp., respectively. In other emerging markets, the increase in non-financial corporate debt in the period was less than 30 pp., to levels generally below 100% of GDP, as can be seen in figure 1 in the appendix.

In terms of economic sectors, the ones that experienced higher debt growth were construction/real estate, mining (especially the oil and gas sub-sector) and utilities, according to IMF (2015).

With regard to leverage, its degree can be measured using various indexes. Two indicators commonly used are: i) Total liabilities to total equity; ii) Total liabilities to earnings before taxes (EBT). Using a compilation of data from EMEs companies, both indicators had a significant expansion between 2007 and 2013: the first, by 88 pp. and the second, by 28 pp., according to IMF (2015).

Regarding emerging companies' foreign debt, Mc Cauley et al (2015a) estimate that the percentage of non-financial corporate debt denominated in U.S. dollars in Q2 2015 averaged 10%. However, these figures varied widely among countries (from 5% in China¹ to 52% in Indonesia and 66% in Mexico). Nevertheless, these values are a simple estimate of the amount of EMEs firms dollar denominated debt, and do not take into account financial and operational hedging instruments available.

An alternative measure of foreign exchange exposure is estimated in IMF (2015), which draws a sample of 5000 firms in 31 emerging countries between 2001 and 2014, and calculates net values excluding financial and operational hedging mechanisms². The study concluded that, with the exception of China, there was a significant expansion of net foreign exchange exposure of emerging companies in the period. The increase in net foreign exchange exposure level in EMEA was from 45% to 50% (5 pp.). In Latin America, it has increased from about 40% to 60% (20 pp.). In general, non-tradable sectors have higher net foreign exchange exposure, because non-tradables cannot rely on the alternative of operational hedging (available for tradable sectors). Still, this operational hedging might not be enough to protect balance sheets of tradable sectors, as they are also negatively affected in occasions when commodity prices fall and exports volumes decline, with a slowdown in international trade.

Regarding the profile of non-financial corporate debt in emerging countries, there was also a significant change in its composition in post-2008 crisis period. Although most of the debt remained being funded by bank loans, an increasing share of EMEs firms' debt has been funded by bonds issued in capital markets (from 9% in 2007 to 17% in 2014, according to IMF 2015). In absolute terms, the amount of annual non-financial corporate debt issuance jumped from about US\$ 586 billion in 2007 to US\$ 3.025

¹ Despite the low percentage of corporate debt denominated in dollars in China, the significant increase of leverage in sectors such as real estate and construction in recent years has drawn attention to the level of non-financial corporate debt in this country.

² Net foreign exchange exposure is estimated using the sensitivity of the company's share price to exchange rate fluctuations according to an augmented CAPM model. It incorporates a β coefficient, which represents the foreign currency exposure of a firm, net of financial and operational ("natural") hedging mechanisms. A positive currency exposure means that the firm's share price falls when the exchange rate depreciates.

trillion in 2014. In many countries, there was an increase in the concentration of debt issuance by major companies. In terms of sectors, the most relevant issuers were construction and oil/gas. Regarding the currency of issuance of these securities, domestic ones accounted for a larger share. However, there was an increase in the foreign share of non-financial corporate debt issuance in EMEs excluding China³, from about 40% between 2003-2007 to 45% between 2010-2014. The most used foreign currency was the dollar (usually over 80%), with the euro, yen and other currencies composing a smaller share.

It is worth mentioning that using bonds as source of funding has advantages and disadvantages for firms. The advantages are: i) Better financing conditions when compared to bank loans, such as lower costs and longer maturities⁴ and ii) Using capital markets as an alternative source of funding, even when banks are more restrictive. Among the disadvantages, it can be mentioned: i) The increasing reliance on funding from more volatile sources (i.e. institutional investors) and ii) Market investors are less stringent in monitoring firms' balance sheets than banks, fact that may encourage excessive leverage and risk-taking by firms.

Regarding the allocation of funds raised by companies through bonds, there is no consensus about their destination. On the one hand, Chui et al (2014) mention the existence of studies showing a one-third increase in capital investments by 120 companies that issued bonds in EMEs between 2010 and 2013. However, the increased availability of resources for funding would have decreased entrepreneurs' minimum expected rate of return. This would have removed constraints for the implementation of several new investment projects, including the ones with lower profitability. In other words, the availability of funding would have allowed an increase in the amount of investments, but also the implementation of less profitable projects. Then, even with more favorable financing conditions, the growth in debt amounts and the fall in investments profitability led to a deterioration of EMEs firms debt repayment capacity. In particular, a firm would present risk to be in arrears with interest payments when its interest coverage ratio is lower than 2. IMF data (2015) shows that the percentage of EMEs firms whose interest coverage ratio was below 2 increased from 17% in 2007 to 36% in 2013. A more recent number regarding EMEs companies debt repayment capacity was published in IMF (2016), showing that the percentage of EMEs companies whose earnings were lower than interest expenses (interest coverage ratio below 1, a more critical situation) was of around 11% , corresponding to US\$ 430 billion of "debt at risk".

On the other hand, several studies point that bond issuance resources were less used for new investments, and more destined towards refinancing debt or buying short-term financial assets. According to IMF (2015), the allocation of funds raised by firms through bonds was higher for refinancing than for new investments⁵. Moreover, Chui et al (2014) mention that high interest rate differentials from domestic to international levels stimulated an intensification in carry trade activities by firms, which suggests the allocation of these resources for speculative purposes. A sign of those activities is the increase in companies' assets held as cash or bank deposits, which has grown significantly since 2009. The fact that this trend has not reversed after the crisis shows that the accumulation of financial resources by firms wasn't only a precautionary behavior immediately after the 2008 episode. Conversely, it was a strategy to increase financial returns, raising funds abroad with low interest rates and depositing in local banks or buying high yield assets from institutional investors.

Other factor associated with this process was the expansion of bond issuance through offshore subsidiaries, benefiting from jurisdictions that offer tax and regulatory advantages. The headquarters of these subsidiaries are located mainly in the following countries: China, Brazil, Russia, India and South Africa. Mc Cauley et al (2015a) estimated that in the second quarter of 2015, these offshore subsidiaries

³ If we consider the total of emerging countries including China, the share of issuance in foreign currency decreased after the crisis, given the high amount of issuance in this country, mostly denominated in renminbi.

⁴ Indeed, IMF data (2015) shows that, in average, EMEs firms have managed to raise funds with yields 2 pp lower in 2014 (5%) than in 2007 (7%), and with a one year longer term (6 years in 2014 vs. 5 years in 2007). One of the factors that played a role for these favorable funding conditions was accommodative monetary policies prevailing in the global economy after the crisis.

⁵ This does not mean that firms have necessarily decreased their amount of investment. Instead, it means that firms have used a larger portion of bond issuance proceeds to refinance debt or to buy short-term assets, and may have increased their investments with other resources. But with the decrease in minimum expected rates of return, the profitability of those new investments was lower.

held an amount of bonds of US\$ 558 billion. With the funds obtained abroad, an offshore subsidiary of a non-financial company can transfer funds to their home country through three channels: i) Making a direct loan for its headquarters (within-company flows); ii) Providing credit to other non-financial companies (between-company flows) or iii) Making a cross-border deposit in a bank (corporate deposit flows). Based on an analysis of emerging countries' balance of payments data performed by Avdjiev et al (2014), it was noted that capital flows to EMEs associated with all three mentioned channels have grown considerably in the period between 2009 and 2014. As most of these flows were allocated for financial, rather than real activities, evidence suggest that offshore subsidiaries of emerging companies have acted in this period also as financial intermediaries, obtaining funds from global investors through bond issuance and remitting these resources to their home countries through those three different channels. Nonetheless, it's important to point that the increase in bond issuance abroad by EMEs firms was not only due to their own strategy to enlarge their investor base and raise funds with better conditions, but it was also a consequence of the interests/demands of international investors, seeking higher yields.

Overall, the features of corporate debt presented in this section showed that non-financial companies in emerging countries expanded considerably their presence in financial markets, searching for higher profits and often acting as financial intermediaries. They increased their degree of leverage and net foreign currency exposure, especially in the post-2008 crisis period, and a significant share of them later presented deterioration in debt repayment capacity.

3. Literature Review

In this section we present a literature review on theoretical approaches that underpin debt expansion in corporations and its features (subsection 3.1), and empirical articles that seek to understand the determinants of corporate debt in emerging economies (subsection 3.2).

3.1 Theoretical Approaches for Corporate Debt Expansion

The features of corporate debt described in section 2 (increase in leverage and net foreign currency exposure, with later deterioration in debt repayment capacity) would have as a common point *agents' procyclical behavior*, being in accordance with theoretical approaches that have been well described both in the mainstream and heterodox literature.

In the mainstream literature, Bruno and Shin (2015) highlight the "risk-taking channel of monetary policy"⁶, and its impact on financial and real variables through bank leverage. These authors develop a model where looser international financial conditions (expansionary US monetary policy) are associated with an increase in cross-border capital flows intermediated through higher leverage in the international banking system. The mechanism operates via stronger local borrower balance sheets as a result of local currency appreciation, allowing banks to lend more and take on more risk. Feyen et al (2015) argue that this mechanism would also apply for corporate foreign bond issuance. Looser international financial conditions would be associated to a US dollar real depreciation, increasing the propensity for emerging market corporations to issue abroad above their historical average volume. More specifically, when domestic currency appreciates, local companies' balance sheets strengthen. This would increase their external borrowing capacity, fostering higher cross-border inflows into EMEs by international investors who are willing to take on more risk. Conversely, tighter international financial conditions would lead to an appreciation of the US dollar and cross border capital outflows from EMEs, with depreciation of domestic currencies, reducing companies' external borrowing capacity and weakening their balance sheets.

In the heterodox literature, descriptions of agents' procyclical behavior date back to Keynes General Theory (1936). Assuming fundamental uncertainty and adaptive expectations, Keynes argued that each individual has the incentive to imitate other agents' average behavior (conventional or herd behavior). As long-term expectations are formed under a fragile basis, those expectations would be

⁶ The "risk-taking channel of monetary policy" was an expression coined by Borio and Zhu (2012), who intended to convey the impact of monetary policy on the willingness of market participants to take on risk exposures, thus influencing financial conditions and real economic decisions.

subject to sudden shifts, due to changes in entrepreneurs "animal spirits" that would influence their actions. This change in entrepreneurs' views could spread through the market (herd behavior), triggering a "self-fulfilling prophecy": entrepreneurs' pessimism leads them to invest less, and thus the economy enters a downward trajectory, "confirming" the initial pessimism. A more in depth analysis of firms' procyclical behavior was made by Hyman Minsky (1992) with his "Financial Instability Hypothesis". This concept was based in two central propositions: the first is that there are stable funding models and unstable ones; the second is that in prolonged periods of economic growth, stable financial relations may become unstable. Under this view, after an expansionary period with increasing liquidity and credit, firms would take more speculative and Ponzi postures, deteriorating their "safety margins" (i.e. debt repayment capacity) and weakening their balance sheet positions. In this context, Minsky argued that procyclical behavior and the generation of instability and crises are features intrinsic to capitalist dynamics. Hence, he believed that a financial crisis of great magnitude did not need to be necessarily triggered by a huge adverse shock. Conversely, a reversal of expectations caused by a one-off episode would be sufficient to modify refinancing conditions and, consequently, to push firms that were already under weak balance sheet conditions to a situation of illiquidity/insolvency.

3.2 Empirical Literature Review on the Determinants of Corporate Debt in Emerging Countries

The literature which investigates debts in emerging economies and their determinants is quite vast. It covers several episodes of crises, related to sovereign debt, banks, exchange rate depreciations, as well as their interlinkages with important macroeconomics aspects, such as emerging countries' fiscal positions, current accounts and capital flows. However, articles which try to deal specifically with the issue of the determinants of corporate debt in emerging economies in a global sense (not from a single country or region, as a consequence of a local/regional crisis) became more frequent only recently, especially after 2013, when macroeconomic conditions in EMEs in general deteriorated, and institutions such as the IMF and BIS started to highlight in their reports concerns related to the growth of corporate debt in those countries.

For instance, Mc Cauley et al (2015b) center their analysis on the growth of US dollar credit to non-residents on a sample of 22 countries (of which 14 emerging economies) through the period Q1 2000 - Q2 2014. In order to take into account the changes in the profile of credit, they use two different dependent variables: the log change in loan/GDP, and the log change in bonds/GDP. They also test alternative samples (2000-2014, before 2008, after 2008). They find that, prior to 2008, the determinants of US dollar credit growth were more related to common drivers of international bank credit: bank leverage (as measured by financial commercial paper and broker-dealer repo), or low-cost leverage (as measured by the VIX). For longer time series (i.e. year on year, rather than quarterly growth rates), they find that the level of the Federal Funds rate matters, especially in occasions when the effective Federal Funds rate is below the one prescribed by the Taylor rule.

Furthermore, Feyen et al (2015) gather data of the universe of all foreign bonds issued by 71 emerging and developing economies (companies/governments) during the 2000-14 period, and show that global factors had a powerful impact on primary activity in international bond market by corporations and sovereign governments of emerging and developing economies. In particular, after conducting a panel regression analysis, these authors found that a decrease in i) expected U.S. equity market/ interest rate volatility, ii) U.S. corporate credit spreads, iii) U.S. interbank funding costs and an increase in the Federal Reserve's balance sheet were associated to the following events: i) Increase the probability that the monthly external issuance volume is above its own historical average; ii) Lower yield-to-maturity spread of external bonds at the time of issuance; iii) Increase the maturity of non-perpetual external emerging and developing economies bonds at the time of issuance.

In addition, Serena and Moreno (2016) analyze the determinants of US dollar bonds issued offshore, for a sample of 41 countries (34 EMEs) from 2000-2015. They find that easier external financing conditions (proxied by a lower VIX) increase the amount issued in offshore bond markets. However, this impact is increased if countries present some of the following constraints: i) low onshore financial market depth; ii) presence of capital controls on local bond markets; iii) Presence of withholding taxes on corporate bond income. Hence, the authors show that, even if external financing costs fell,

limited financing opportunities in domestic markets also played an important role in inducing EME firms to raise their offshore bond issuance.

Moreover, a study presented in IMF (2015) uses private databases of more than 1 million non-financial firms for 24 emerging market economies, during the period 2004–2013, totaling more than 1.3 million firm-year observations. They run a panel regression model where their dependent variable is the change in leverage (change of total liabilities/book equity), and their main explanatory variables are grouped into three categories: Firm Indicators (e.g. measures of size, profitability and asset tangibility), Country Macro Indicators (i.e. International Country Risk Guide - ICRG), Global Indicators (price of oil, US shadow interest rate, VIX, Global GDP), as well as some interactions among those variables and dummies for firm fixed effects. Their main result is that a decrease in the US shadow rate is associated with faster leverage growth, with a higher effect for the subsample 2010-2013.

4. Determinants of Corporate Debt Expansion in Emerging Countries

The objective of this section is to explain what factors were behind the expansion of corporate debt observed in emerging countries' companies during the period 2000-2016. We undertake a panel analysis where we present a number of factors, with domestic and global origins, in order to check whether they were significant to explain corporate debt growth in EMEs corporations. In particular, we aim to identify the main changes in the explanatory factors of EMEs corporate debt expansion before and after the 2008 crisis.

4.1 Data

Our dataset gathers 15 emerging countries: Brazil, Chile, Czech Republic, China, Hungary, India, Indonesia, Malaysia, Mexico, Poland, Russia, South Africa, South Korea, Thailand, Turkey. All those countries are emerging markets according the BIS definition, and are listed on the MSCI EME index⁷, which provides aggregate indicators for firms in each of those countries. Their geographical distribution is the following: Latin America (3 - Brazil, Chile, Mexico); Emerging Europe, Middle East and Africa (6 - Czech Republic, Hungary, Poland, Russia, South Africa, Turkey); Emerging Asia: (6 - China, India, Indonesia, South Korea, Malaysia, Thailand).

The time period analyzed is 2000 Q1-2016 Q4, with quarterly data. We also compare sub-samples for periods before the 2008 financial crisis (2001 Q1-2007 Q4), and after the crisis financial crisis (2009 Q1 - 2016 Q4). In our model, the dependent variable for corporate debt expansion - *Leverage* - is measured as companies' *Debt to Equity ratio* in each of the countries, obtained from MSCI country indexes. The explanatory variables are divided into two big groups: *Country* and *Global* factors.

Country Factors: Represent factors that are linked with individual features in each country, whether microeconomic (firms' fundamentals) or macroeconomic (aggregate economic indicators).

Microeconomic Factors: Balance sheet indicators, based on reports from publicly traded companies, which are compiled by MSCI to compose indexes for each indicator in its respective country. They measure companies' main accounting aspects:

- i) Profitability: return on assets (ROA)
- ii) Solvency ratio: free cash flow per share /short and long term debt
- iii) Liquidity: current ratio (current assets/current liabilities)
- iv) Asset quality: tangible assets per share

Macroeconomic Factors: Main country indicators supposed to be relevant for companies' leverage

- i) Real GDP growth (% YoY). Our source to this data was the IMF International Financial Statistics (IFS) database.
- ii) Monetary Policy Rate (% YoY), obtained on the BIS statistics database.
- iii) Real Effective Exchange Rate (REER). Our source was the BIS statistics database.

⁷ An index created by Morgan Stanley Capital International (MSCI) that is designed to measure equity *market* performance in global emerging markets. It captures large and mid cap representations, covering about 85% of the market capitalization in each country.

Global Factors: Include elements that have global implications, or are common for the world economy as a whole.

- i) Monetary policy rate of four major central banks (FED, ECB, BOE, BOJ). Measured through the "Shadow Short Rate (SSR)", based on the short-term policy interest rate, but accounting the stance and direction of monetary policy (level and slope), including the use of unconventional measures. The term structure of interest rates is used to find what policy rate would generate the observed yield curve if the policy rate could be taken to negative values. The "shadow rate" curve is obtained from calculating the value of a call option to hold cash at the ZLB and subtracting it from the actual yield curve. Our source to those rates was Krippner (2016).
- ii) Real Global GDP growth (% YoY). Our source was the IMF IFS database.
- iii) Commodity price: All Commodity price index, compiled by the IMF. It is composed by weighted averages US dollar prices (2005=100) of non-fuel (edible, industrial inputs) and energy commodities.
- iv) VIX: Index of market's expectation of US stock market (S&P 500) volatility over the next 30-day period, calculated by the Chicago Board Option Exchange (CBOE). Proxy for market sentiment/global risk aversion, as described by several authors such as Rey (2015) and the ones mentioned in subsection 3.2.

4.2 Model Specification and Methodology:

Regarding the model specification, our main panel regression is the following:

$$\Delta \log Leverage = c + \Delta \log CountryFactors + \Delta \log GlobalFactors + \varepsilon$$

This specification broadly follows the one used in IMF (2015). The dependent and independent variables are all presented in quarterly log changes, and we also do proper stationary tests to make sure there are no unit roots in the series. To address a possible endogeneity problem on microeconomic factors (higher firm leverage influencing contemporaneous balance sheet indicators - profitability, liquidity, solvency, asset tangibility), the variables that measure them are lagged by one quarter, so that balance sheet indicators in the previous quarter will eventually explain leverage.

On an alternative specification, we also include an interaction term between two important variables, namely Commodity Price Index and the Real Effective Exchange Rate, so we can analyze how the introduction of this interaction term affects the model results.

$$\Delta \log Leverage = c + \Delta \log CountryFactors + \Delta \log GlobalFactors + \Delta \log Interaction + \varepsilon$$

The interaction term captures a singular relationship that exists between commodity prices and exchange rate movements, particularly in emerging commodity exporting countries. The idea is that an increase in global commodity prices would result in an improvement of commodity exporters' terms of trade, raising prospective currency inflows and leading to appreciation of foreign exchange in those countries, therefore reinforcing easing borrowing conditions for firms, especially abroad. This special link between commodity prices and exchange rates is documented by Kohlscheen et al (2017), who affirm this link goes beyond the global risk appetite (i.e. the one driven by the simultaneous movement of investors into / out of commodity markets and high-yielding currencies during risk-on/risk-off episodes), but do not use it with the purpose to explain the rise in corporate debt. The introduction of an interaction term between two explanatory variables could raise a question about the presence of multicollinearity in the model. But multicollinearity is not considered an issue for the model as a whole when using interaction terms, once the *p*-value for the interaction is not affected by the multicollinearity, according to authors such as Goldberger (1991) and Allison (2012)⁸.

⁸ Those authors explain that, before creating the interactions, one can reduce the correlations by subtracting the means (centering) the variables. But the *p*-value for the interaction will be exactly the same, regardless of whether or not one centers the variables. And all the results for the other variables (including the R2) will be the same in either case. So the multicollinearity has no adverse consequences in this situation. Furthermore, they explain that multicollinearity main problem

The methodology employed was a Feasible Generalized Least Squares (FGLS) estimation on the previous regressions. In order to control for omitted variable bias, we make the option to use first differences, as our aim is to control for unobserved heterogeneity among selected countries across time. In the panel estimation, we add weights that follow the Cross Section Seemingly Unrelated Regression (SUR) method, to include robustness to groupwise heteroskedasticity, autocorrelation and cross section dependence. On the coefficient covariance, we also use the Cross Section SUR method, but with a modified specification (Panel-Corrected Standard Errors PCSE), which has an increased accuracy in hypothesis testing⁹.

Table 1 in the appendix provides a summary of the expected signs of the relationships between the dependent variable with each one of the explanatory variables.

Regarding the expected signs addressing the relationship between microeconomic factors and leverage, they can be positive or negative, and depend on the theoretical approach adopted. There would be a positive correlation between the variable and leverage if one considers the trade-off theory, and a negative correlation if it is considered the pecking order theory¹⁰. In general terms, the argument in favor of the trade-off theory supposes that firms with higher levels of profitability, solvency, liquidity and asset tangibility face lower expected costs of financial distress and find interest tax deductions more valuable, thus having higher incentives to take on more debt. Conversely, the argument supported by the pecking order theory assumes that firms with higher levels of profitability, solvency, liquidity and asset tangibility dispose of more internal funds and may rely less on external funds, hence there would be less incentive to increase leverage.

For macroeconomic factors, the expected signs are that higher levels of leverage would be associated with: a higher level of real GDP growth (higher domestic demand would foster an expansion in leverage); lower domestic monetary policy rate (lower policy rates would increase borrowing and leverage by firms); higher REER level (more appreciated exchange rate would allow higher leverage, especially in foreign currency).

When it comes to global factors, the expected signs are that higher levels of leverage would be associated with: a higher level of real global GDP growth (higher global demand would foster an expansion in leverage); higher commodity prices (higher commodity prices would incentivize more investments in this sector by EMEs companies and an increase in leverage); lower VIX (lower volatility in financial markets would encourage investors sentiment and an expansion in leverage); lower international interest rates. In particular, the transmission of a more accommodative stance by main

is variance inflation, which imply high standard errors for the variables, and p-values less likely to be below a critical threshold. If confidence intervals are still small enough to have significant p-values in spite of sizable standard errors, then it is very likely that the actual effect of each variable is being isolated. That is what we observe in the results in the 2009-2016 sample, where each of the variables REER, Commodity Prices and Commodity Prices*REER have different coefficients, which are significant and whose values exceed the ones of the respective standard errors, supporting that individual coefficient effects are being properly isolated in the model.

⁹ The Cross Section Seemingly Unrelated (SUR) method uses an error structure clustered by period. The method proceeds in two stages: (i) The model is estimated by OLS and the residuals are used to build a consistent estimator of the errors covariance matrix; (ii) Using this consistent estimator on the errors covariance matrix, one can implement a Feasible GLS estimation. The method is also known as Parks estimator, once the classic reference for this method is Parks (1967). On its turn, the Panel-Corrected Standard Errors (PCSE) was an alternative specification of the Parks estimator developed by Beck and Katz (1995), which preserves the weighting of observations for autocorrelation, but uses a sandwich estimator to incorporate cross-sectional dependence when calculating standard errors. Moundigbaye et al (2017) show that the Parks estimator has the highest degree of efficiency in panel analysis when the ratio T/N is above 1.5 (case of our samples). In addition, the PCSE specification on the coefficient covariance improves the accuracy of hypothesis testing.

¹⁰ Under the literature of Corporate Finance, two main different approaches try to explain the determinants of corporate leverage, according to Adair and Adaskou (2015). On the one hand, the trade-off theory supposes that firms choose how to allocate their resources comparing the tax benefits of debt with the bankruptcy costs associated, targeting an optimal debt ratio. On the other hand, the pecking order theory assumes that firms prefer a sequential choice over funding sources. They avoid external financing if they have internal financing available and avoid new equity financing whenever they can engage in new debt financing. Debt funding would be preferred than equity funding because the cost of debt is usually lower, once it's a deductible expense. Additionally, although equity financing is less risky as regards cash flow commitments, it dilutes share ownership, control and earnings. According to the authors, there is no consensus in the literature, with evidence supporting both theories, varying according to each different situation.

central banks (including the implementation of quantitative easing programs - QEs) into an increase in corporate debt would occur through two ways: i) stock channel (QEs leading to lower risk premia and better financing conditions); flow channel (central bank asset purchases inducing portfolio rebalancing across countries, "crowding out" investors towards corporate bonds). According to Lo Duca et al (2016), the channel which would be more relevant for EMEs companies would be the first one.

Regarding the interaction term, its expected sign is positive, once it's composed by the product of two terms with expected positive signs (commodity prices and REER).

4.3 Results

Table 2 in the appendix reports our estimation output results. Analyzing the results of the table as a whole, we observe that the signs of the coefficients are according to previously expected. For microeconomic factors, the signs are positive, hence in accordance with the trade-off theory. One of the main explanatory factors for leverage would be the real effective exchange rate (REER), once this variable is significant in all specifications, and it has the largest coefficient in most samples (except 2009-2016). Its positive sign means an exchange rate appreciation in EMEs is linked to an increase in firms' debt/equity ratios.

Observing the full sample (2000 Q1-2016 Q4), we see that beyond the REER, other variables that presented statistical significance were: i) At the microeconomic level, the ones related to firms' profitability (return on assets), liquidity (current ratio) and asset tangibility (tangible assets per share), all positively related to leverage; ii) At the global level, the variable which represents USA monetary policy stance (US shadow short rate) and the VIX (proxy for global risk aversion), both negatively related to leverage, meaning leverage tends to increase when those variables are lower.

In the sample 2000 Q1- 2007 Q4, the most significant variables are at country level: the exchange rate (REER) and firms' profitability (return on assets). Other variables are also significant: at micro level, firms' solvency ratio (free cash flow per share /short and long term debt); at the global level, the VIX. Even so, the degree of significance of those two last variables is lower (p-values closer to 10%).

In the sample 2009 Q1- 2016 Q4, several variables are significant: at the micro level, firms' liquidity and asset tangibility indexes; at the macro level, REER and real GDP growth; at the global level, the VIX and US shadow short rates are strongly significant; the UK shadow short rate is also significant, albeit at a lower level¹¹. In the specification with the interaction term, also appear as significant firms' profitability in the micro level, and Global GDP growth at global level. And most importantly, in this specification Commodity Prices and the interaction Commodity Price*REER are strongly significant and have the largest coefficients. Their positive sign mean an increase in commodity prices, and the interaction between higher commodity prices and exchange rate appreciation in EMEs are linked to an increase in firms' leverage. This finding is in accordance with data which shows that a considerable share of EMEs corporate debt after 2008 was taken by commodity sector industries, as was previously described in section 2.

In order to analyze better the changes in the determinants of corporate debt expansion between the time periods analyzed, we perform Wald tests to check the joint significance of independent variables' coefficients. The results are reported in Table 3 in the appendix.

We divide the coefficients into two big groups: country coefficients and global coefficients. Country coefficients are then split into two smaller groups: Micro (firm factors) and Macro (aggregate economic factors). Global coefficients are also divided into two groups: one that gathers main central banks' monetary policy rates (US, Euro, UK and Japan shadow short rates), and a second that accounts for other global variables in the model (global GDP growth, commodity price index and VIX). In the specification that considers the interaction term Commodity Price*REER, the term was included in the domestic macro factors (as the REER), due to its particular influence according to each country. In order to verify the statistical significance of each coefficient block, we test two hypotheses: i) If the coefficients

¹¹ The fact that FED's accommodative policies have a higher impact on EMEs corporate debt and capital flows to emerging economies in general, when compared to other major central banks (BOE, BOJ, ECB), can be understood, among other factors, by the role of the dollar as a benchmark for offshore credit in most emerging markets and at a global level. This result is in accordance with other studies in the literature, such as Chen et al (2017).

are different in the 15 countries; ii) If the coefficients are different from zero in the 15 countries. Thus, an answer “Yes” implies the joint coefficients have statistical significance as a group, while an answer “No” means they don’t have joint statistical significance.

The results in both specifications (without and with the interaction term) are similar, and analyzing them one can reach the following conclusions. Before the 2008 crisis, the main determinants of debt expansion were in the group of *country* factors (as shown by the high significance of the return on assets in domestic microeconomic factors, and the REER in domestic macroeconomic factors). Conversely, after the 2008 crisis, while country factors remain important, factors in the *global* group also gain ground, both in the block related to international interest rates (e.g. US shadow short rate), as well as in the block related to other global variables (VIX, commodity prices, Global GDP growth). Those results are consistent with other studies available in the literature previously mentioned in subsection 3.2.

As a robustness analysis, we removed China from the country sample, in order to test if its faster pace of credit growth when compared to other countries and its profile more reliant on local currency debt were introducing some bias on the results. However, the results kept broadly similar to the full country sample, with the same variables appearing as significant and in the same degree of significance, as reported in table 5 in the appendix.

Overall, our findings suggest that the exchange rate has been one of the most important determinants that explain the increase in EMEs companies' debt through the period 2000-2016, and also in the period before the 2008 crisis. But after 2008, beyond some country level factors (exchange rate, national GDP growth, firms higher liquidity levels), other factors that have global origins (more accommodative monetary policy stance in USA, lower financial market volatility, higher commodity prices, global GDP growth) have become increasingly important to explain emerging market corporate debt expansion.

5. Conclusions

This study explores corporate debt expansion in emerging markets after the 2008 crisis, its profile, main determinants, and discusses financial stability implications for those countries. Some of the main features of this expansion in EMEs corporate debt were the increase in leverage, net foreign exchange exposure, later leading to a deterioration of debt repayment capacity in a significant share of them. Those features would have as a common point agents' procyclical behavior, being in accordance with theoretical approaches that have been well described both in the mainstream and heterodox literature, related to concepts such as the risk-taking channel of monetary policy, herd behavior and financial instability hypothesis.

Our contribution in this literature is to investigate the determinants of EMEs corporate debt expansion by using a dataset which goes from 2000 Q1 up to a more recent period (2016 Q4), and with subsamples before and after the 2008 crisis, so we identify the main changes in the factors that explain EMEs corporate debt expansion before and after this event. Among them, a factor which was not previously used in the literature with that purpose: the interaction between higher commodity prices and more appreciated exchange rates. Our findings suggest that the exchange rate has been one of the most important determinants that explain the increase in EMEs companies' debt through the period 2000-2016, and also in the period before the 2008 crisis. But after 2008, beyond some country level factors (exchange rate, national GDP growth, firms higher liquidity levels), other factors that have global origins (more accommodative monetary policy stance in USA, lower financial market volatility, higher commodity prices, global GDP growth) have become increasingly important to explain emerging market corporate debt expansion.

Hence, if EMEs companies are more sensitive to the movements of the global economy, a reversal of international favorable conditions may generate adverse effects, increasing firms' borrowing costs, worsening debt rollover conditions and weakening their balance sheets. In this context, difficulties posed by the international economic scenario - uncertainties in major economies as well as large swings in emerging currencies and commodity prices - together with problems related to currency mismatch; susceptibility to the interests of creditors/ institutional investors/ banks and macroeconomic volatility may put into question the financial sustainability of these companies. Moreover, although in recent decades

several macroeconomic lines of defense have been developed by EMEs governments to combat economic/financial crises, the capacity of such lines to fulfill private firms' needs in occasions of crises is uncertain, due to the mentioned problems.

Ultimately, we draw attention to the need for policies oriented not only to enhance macroeconomic fundamentals, but also to improve regulatory/supervisory frameworks and micro/macro prudential instruments. Due to the close relationship between macroprudential and financial regulation/supervision with antitrust, fiscal and monetary policies, it would be recommended an improvement in the coordination among those policies. In particular, with appropriate coordination between monetary and macroprudential policies, central banks and financial supervision authorities could take balanced decisions, aiming to achieve both macroeconomic and financial stability. Therefore, emerging countries could strengthen the monitoring of individual/systemic risks, enhancing their resilience against financial crises.

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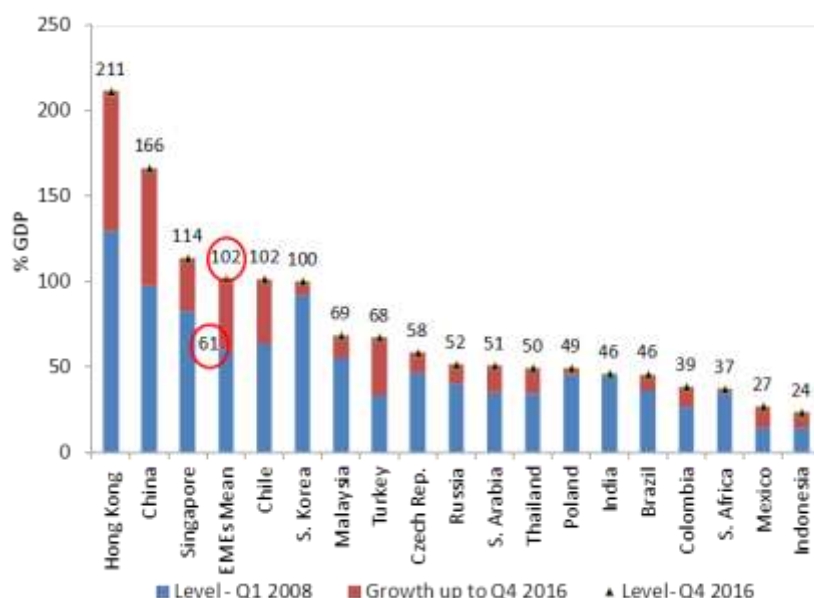
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Appendix

Figure 1- Credit to Non-financial Corporations - Q1/2008 to Q4/2016 (% GDP)



Note: EMEs mean is composed by the 18 countries in the figure, plus Argentina, Hungary and Israel, which were excluded from the figure because they have presented negative corporate credit growth in the period (-4 pp., -7 pp. and -22 pp., respectively). Source: BIS (2017).

Table 1- Expected sign for Relationship between Leverage and Explanatory Variables

Explanatory Variable	Expected Sign	Reference in Literature
Microeconomic Factors		
Profitability: Return on assets	Positive/ Negative	Adair and Adaskou (2015) IMF (2015a)
Solvency ratio: Free cash flow per share /Short and long term debt	Positive/ Negative	Adair and Adaskou (2015) IMF (2015a)
Liquidity: Current ratio	Positive/ Negative	IMF (2015a)
Asset Quality: Tangible assets per share	Positive/ Negative	Adair and Adaskou (2015) IMF (2015a)
Macroeconomic Factors		
Real GDP Growth	Positive	Feyen et al (2015) IMF (2015a)
Monetary Policy Rate	Negative	IMF (2015a) Lo Duca et al (2016)
Real Effective Exchange Rate	Positive	Feyen et al (2015) IMF (2015a)
Global Factors		
Monetary policy rate of FED, ECB, BOE, BOJ	Negative	Feyen et al (2015) IMF (2015a) Lo Duca et al (2016)
Real Global GDP Growth	Positive	Feyen et al (2015) IMF (2015a)
Commodity Price	Positive	IMF (2015a) Kohlscheen et al (2017)
VIX	Negative	Mc Cauley et al (2015b) Serena and Moreno (2016)
Interaction		
Commodity Price*REER	Positive	-

Table 2 - Panel Estimation Output – Results

Dependent Variable: Debt to Equity						
Independent Variables	2000 Q1 - 2016 Q4		2000 Q1 - 2007 Q4		2009 Q1 - 2016 Q4	
	No Interaction	Interaction	No Interaction	Interaction	No Interaction	Interaction
Country						
Return on Assets (1 lag)	0.029*** (0.011)	0.029*** (0.011)	0.045*** (0.013)	0.048*** (0.013)	0.011 (0.010)	0.020** (0.010)
Free Cash Flow/Short Long Term Debt (1 lag)	0.002 (0.003)	0.002 (0.003)	0.010* (0.005)	0.009* (0.006)	0.002 (0.002)	0.003 (0.002)
Tangible Assets per share (1 lag)	0.024* (0.013)	0.024* (0.013)	0.006 (0.013)	0.005 (0.014)	0.028* (0.017)	0.024 (0.017)
Current ratio (1 lag)	0.109*** (0.023)	0.108*** (0.023)	0.038 (0.027)	0.037 (0.027)	0.188*** (0.021)	0.199*** (0.020)
Real GDP Growth	0.001 (0.004)	0.001 (0.004)	0.006 (0.007)	0.005 (0.007)	0.009*** (0.003)	0.007*** (0.002)
Monetary policy rate	-0.015 (0.018)	-0.015 (0.018)	-0.024 (0.023)	-0.027 (0.024)	-0.004 (0.016)	-0.001 (0.016)
REER	0.396*** (0.068)	0.381*** (0.069)	0.591*** (0.095)	0.587*** (0.098)	0.131*** (0.047)	0.185*** (0.050)
Global						
US shadow short rate	-0.009* (0.005)	-0.009* (0.005)	-0.004 (0.033)	-0.002 (0.036)	-0.008*** (0.002)	-0.006*** (0.002)
UK shadow short rate	-0.000 (0.003)	-0.001 (0.003)	-0.300 (0.088)	-0.309 (0.094)	-0.003* (0.001)	-0.002* (0.001)
EUR shadow short rate	-0.002 (0.012)	-0.002 (0.012)	-0.222 (0.085)	-0.236 (0.091)	-0.006 (0.005)	-0.009 (0.004)
Japan shadow short rate	-0.013 (0.007)	-0.013 (0.007)	-0.017 (0.006)	-0.017 (0.006)	-0.041 (0.008)	-0.054 (0.007)
Global GDP Growth	0.008 (0.010)	0.009 (0.010)	0.022 (0.037)	0.014 (0.039)	0.004 (0.004)	0.008** (0.004)
Commodity price	0.065 (0.041)	0.003 (0.088)	0.109 (0.063)	0.106 (0.096)	0.020 (0.026)	0.335*** (0.049)
VIX	-0.034*** (0.009)	-0.033*** (0.010)	-0.068* (0.015)	-0.068* (0.016)	-0.024*** (0.005)	-0.024*** (0.004)
Interaction						
Commodity Price*REER	-	0.053 (0.062)	-	0.006 (0.067)	-	0.265*** (0.035)
Other Information						
Number of quarters	66	66	30	30	32	32
Observations	913	913	373	373	480	480
R2 (GLS weighted)	0.092	0.094	0.204	0.196	0.316	0.401

Notes: All variables are measured in log changes. P values: *, **, ***, denote statistical significance at the 10, 5 and 1 percent level, respectively. Robust standard errors are in parenthesis

Table 3 - Joint Significance on Independent Variables' Coefficients (Wald Test):

Coefficient Group	2000 Q1 - 2016 Q4		2000 Q1 - 2007 Q4		2009 Q1 - 2016 Q4	
	No Interaction	Interaction	No Interaction	Interaction	No Interaction	Interaction
Domestic Microeconomic Factors						
Different in all countries	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
Different from zero in all countries	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
Domestic Macroeconomic Factors						
Different in all countries	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
Different from zero in all countries	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
Domestic Micro & Macro Factors						
Different in all countries	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
Different from zero in all countries	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
US, UK, Euro Area, Japan Shadow Short Rates						
Different in all countries	Yes*	Yes*	No	No	Yes***	Yes***
Different from zero in all countries	No	No	No	No	Yes***	Yes***
World GDP, Commodity Price, VIX						
Different in all countries	Yes**	Yes**	Yes*	Yes*	Yes***	Yes***
Different from zero in all countries	Yes***	Yes***	Yes*	Yes*	Yes***	Yes***
All Global Factors						
Different in all countries	Yes***	Yes***	Yes*	Yes*	Yes***	Yes***
Different from zero in all countries	Yes***	Yes***	Yes*	Yes*	Yes***	Yes***

Note: P values: *, **, ***, denote statistical significance at the 10, 5 and 1 percent level, respectively.

**Table 4 - Results for model with full country sample and model without China
Specification Without Interaction**

Dependent Variable: Debt to Equity						
Independent Variables	2000 Q1 - 2016 Q4		2000 Q1 - 2007 Q4		2009 Q1 - 2016 Q4	
	Full Country Sample	Without China	Full Country Sample	Without China	Full Country Sample	Without China
Country						
Return on Assets (1 lag)	0.029*** (0.011)	0.024*** (0.012)	0.045*** (0.013)	0.049*** (0.014)	0.011 (0.010)	0.003 (0.012)
Free Cash Flow/Short Long Term Debt (1 lag)	0.002 (0.003)	0.001 (0.003)	0.010* (0.005)	0.010* (0.006)	0.002 (0.002)	0.001 (0.002)
Tangible Assets per share (1 lag)	0.024* (0.013)	0.037*** (0.014)	0.006 (0.013)	0.023 (0.017)	0.028* (0.017)	0.039* (0.017)
Current ratio (1 lag)	0.109*** (0.023)	0.112*** (0.025)	0.038 (0.027)	0.018 (0.030)	0.188*** (0.021)	0.180*** (0.023)
Real GDP Growth	0.001 (0.004)	0.002 (0.004)	0.006 (0.007)	0.010 (0.007)	0.009*** (0.003)	0.005** (0.003)
Monetary policy rate	-0.015 (0.018)	-0.015 (0.018)	-0.024 (0.023)	-0.015 (0.025)	-0.004 (0.016)	-0.017 (0.015)
REER	0.396*** (0.068)	0.421*** (0.071)	0.591*** (0.095)	0.568*** (0.107)	0.131*** (0.047)	0.181*** (0.058)
Global						
US shadow short rate	-0.009* (0.005)	-0.009* (0.005)	-0.004 (0.033)	-0.015 (0.040)	-0.008*** (0.002)	-0.007*** (0.002)
UK shadow short rate	-0.000 (0.003)	-0.001 (0.003)	-0.300 (0.088)	-0.224 (0.110)	-0.003* (0.001)	-0.002* (0.001)
EUR shadow short rate	-0.002 (0.012)	-0.008 (0.012)	-0.222 (0.085)	-0.227 (0.105)	-0.006 (0.005)	-0.003 (0.004)
Japan shadow short rate	-0.013 (0.007)	-0.016 (0.007)	-0.017 (0.006)	-0.013 (0.007)	-0.041 (0.008)	-0.033 (0.008)
Global GDP Growth	0.008 (0.010)	0.006 (0.010)	0.022 (0.037)	0.039 (0.045)	0.004 (0.004)	0.001 (0.004)
Commodity price	0.065 (0.041)	0.077 (0.043)	0.109 (0.063)	0.113 (0.079)	0.020 (0.026)	0.046 (0.026)
VIX	-0.034*** (0.009)	-0.027** (0.010)	-0.068* (0.015)	-0.096* (0.018)	-0.024*** (0.005)	-0.018*** (0.004)
Other Information						
Number of quarters	66	66	30	30	32	32
Observations	913	847	373	343	480	448
R2 (GLS weighted)	0.092	0.098	0.204	0.209	0.316	0.275

Notes: All variables are measured in log changes. P values: *, **, ***, denote statistical significance at the 10, 5 and 1 percent level, respectively. Robust standard errors are in parenthesis.