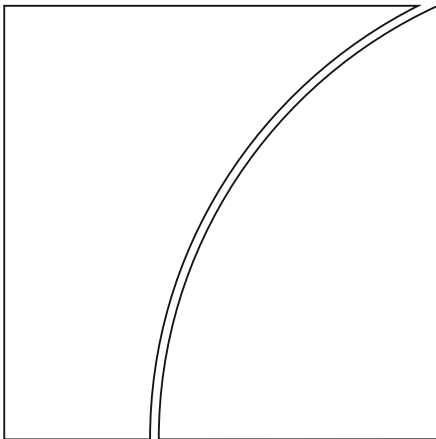BANK FOR INTERNATIONAL SETTLEMENTS

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Financial systems and the real economy

BNM-BIS conference on "Financial systems and the real economy", 16–18 October 2016, Kuala Lumpur, Malaysia

Monetary and Economic Department

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This publication is available on the BIS website (www.bis.org).

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Foreword

Ilhyock Shim[1]

Bank Negara Malaysia and the Bank for International Settlements (BIS) co-hosted a research conference on "Financial systems and the real economy" in Kuala Lumpur, Malaysia, on 17–18 October 2016. This conference was the culmination of the BIS Asian Office's two-year research programme on the same theme that the Asian Consultative Council of the BIS launched in February 2015. The conference brought together senior officials and researchers from central banks, international organisations and academia.

The research papers presented at the conference covered macroprudential policies and firm financing; household credit, growth and inequality in Malaysia; capital structure in emerging Asia; foreign banks and credit conditions in emerging market economies (EMEs); household credit and the effectiveness of monetary and macroprudential policies in Asia-Pacific; and household indebtedness and debt repayment capacity in Malaysia.

Governor Muhammad bin Ibrahim of Bank Negara Malaysia hosted the conference dinner. Deputy Governor Abdul Rasheed Ghaffour of Bank Negara Malaysia gave opening remarks. Paul Tucker (Chair, Systemic Risk Council; and Fellow, Harvard Kennedy School) delivered the keynote address. The conference included panel discussion by Deepak Mohanty (Executive Director, Reserve Bank of India), Johnny Noe Ravalo (Assistant Governor, Bangko Sentral ng Pilipinas), Paul Tucker and Hyun Song Shin (Economic Adviser and Head of Research, BIS). Former Deputy Governor Nor Shamsiah Mohd Yunus of Bank Negara Malaysia chaired the panel.

This volume is a collection of the speeches, papers and prepared discussant remarks from the conference. This foreword summarises the contents of the conference and provides a synopsis of the discussions for time-constrained readers.

In his opening remarks, Deputy Governor Ghaffour delivered three key messages. The first was that policymakers should deliberate on the purpose of taking on debt. In particular, he pointed out that what really matters is who takes on debt and how they use it, and stressed the need for balancing the objectives of financial development and financial stability. The second message was that over-regulation, if not properly balanced and sequenced, might restrain economic growth. Finally, he emphasised the need to embrace innovations in financial technology for sustainable growth.

Paul Tucker's keynote address asked the question, "What is macroprudential policy for?" from the viewpoint of central bank independence. He first pointed out that recent discussion on macroprudential policy focused mostly on tools and processes, but not much on its purpose. Then he stressed that, since unelected authorities tend to implement macroprudential policy, the authorities need to have a clearly defined objective or mandate to perform their jobs, such as building up more buffers in the financial system to improve resilience. He concluded that when

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central banks actively pursue macroprudential policy as unelected power insulated from the politics of government, threats to central bank independence might be emerging in advanced economies (AEs), and that EMEs could provide intellectual and practical leadership in the area of macroprudential policy.

In the first conference paper, Meghana Ayyagari (George Washington University), Thorsten Beck (University of London) and Maria Soledad Martinez Peria (International Monetary Fund) show that changes in macroprudential policies affect credit flows to small and medium-sized enterprises in both AEs and EMEs, and that in EMEs these policies have a major effect on young firms. In addition, they find that in EMEs macroprudential policies targeted at borrowers are generally more effective than those targeted at financial institutions. In his discussion, Jae Ha Park (Korea Institute of Finance) points out the unbalanced nature of the sample of firms across countries, and suggests alternative econometric approaches for robustness checks as well as alternative ways to interpret the key empirical results of the paper.

Jiaming Soh, Amanda Chong and Kue-Peng Chuah (Bank Negara Malaysia) contribute an empirical paper asking whether different types of household credit affect income growth and income inequality in Malaysia by using macro-level data as well as micro-level data based on household surveys conducted in 2009 and 2014. They show that housing credit is positively associated with future income growth, but that consumption credit is not. Regarding income inequality, they find mixed results: the macro-level data indicate that housing credit has a positive relationship with income inequality, but the micro-level data suggest a negative relationship. As the discussant to the paper, Yongheng Deng (National University of Singapore) suggests a more sophisticated modelling strategy to account for potential endogeneity and a tabulation of the unconditional and conditional distributions of key variables in the two surveys.

The paper by Vidhan Goyal (Hong Kong University of Science and Technology) and Frank Packer (BIS) presents measures of leverage as well as regressions for the determinants of leverage for a comprehensive sample of listed firms in seven economies in emerging Asia between 1991 and 2015. They find that recent trends in leverage are less marked than those in the credit-to-GDP ratio. For the sample as a whole, neither the mean nor the median, nor the upper tails of the distribution, show any upward shift in recent years. The country leverage regressions suggest that standard firm characteristics that help to overcome leverage differences across the whole sample may be less important in jurisdictions with stronger institutions. The discussion by Dragon Tang (University of Hong Kong) points out that it is somewhat surprising that the leverage of Asian firms remained stable during the last decade of the sample, and suggests interpreting changes in leverage in the context of the developmental stage of the countries' financial markets.

In their paper on international bank credit flows to EMEs, Patrick McGuire and Torsten Ehlers (BIS) show that direct and indirect cross-border credit were key drivers of domestic credit booms prior to the 2007–09 Great Financial Crisis. Once these cross-border credit flows are controlled for, countries with higher foreign bank participation rates had less severe credit booms than those with lower rates. They explain that this finding reflects the stabilising role of foreign banks' local operations, which are often locally funded, and conclude that what matters is the type of bank claim rather than bank ownership. In his discussion, Glenn Hoggarth (Bank of England) highlights the usefulness of analysing the various dimensions of international credit jointly.

Moritz Schularick (University of Bonn) and Ilhyock Shim (BIS) assess the effects of changes in interest rates and macroprudential measures on various types of credit growth. In particular, they show that both changes in the domestic policy rate and changes in the domestic policy rate instrumented by the US policy rate significantly reduce growth in household and housing credit over a two-year horizon. They also find that general bank credit tightening actions, such as increases in reserve requirements, reduce credit growth over one to four years, and that housing credit tightening actions such as higher loan-to-value ratios are effective only on housing credit over one to two years. Discussant Woon Gyu Choi (International Monetary Fund) suggests that instruments for domestic policy rates to control for foreign policy can include unconventional monetary policy measures taken by the Federal Reserve, the European Central Bank and the Bank of Japan. He also points out that the paper could benefit from taking into account the recent debate on macroeconomic trilemma or dilemma in using instrumental variables for estimation.

In the last conference paper, Muhamad Shukri Abdul Rani, Siti Hanifah Borhan Nordin, Chin Ching Lau, Sheng Ling Lim and Zhen Shing Siow (Bank Negara Malaysia) explore the relationship between the debt service ratio (DSR) and individual borrowers' ability to withstand negative shocks in Malaysia. In particular, they use borrowers' income and debt data obtained from a Bank Negara Malaysia internal database to calculate the borrowers' financial margin, and apply various simulated economic and financial shocks to the financial margin of these borrowers to identify the potential deterioration in their debt repayment capacity. Their simulation results show that, in the pre-shock scenario, borrowers across all income groups are more likely to have a negative financial margin if their DSR is above 60%, and that in the post-shock scenario, they are more likely to have a negative financial margin if their DSR is above 40%. In her discussion, Sock-Yong Phang (Singapore Management University) suggests that factors responsible for the increase in household debt for Malaysia can include not only demand and supply factors but also institutional and behavioural factors. She also points to a likely overestimation of the probability of default of households in the paper. Finally, she emphasises the systemic perspective, noting that the same negative shocks affect corporate debt and household debt simultaneously.

The conference concluded with a policy panel on the theme of "Balancing policy objectives in Asia: leverage vs long-term economic growth", which was chaired by former Deputy Governor Shamsiah. In his panel remarks, Mohanty first pointed out the stress in India's banking sector was largely due to increased leverage in the corporate sector. Then he explained that, in order to avoid high corporate debt levels in India straining firms' debt-servicing capacity, the Reserve Bank of India introduced: (i) a scheme for sustainable restructuring of stressed assets; and (ii) prudential measures to disincentivise banks from limiting their incremental exposure to large borrowers. Ravalo acknowledged that the sharp build-up in both corporate and household debt had not been matched by a commensurate increase in income in the Philippines, but that there were non-trivial data gaps that prevent an unambiguous conclusion on whether or not financial stability concerns were already present. He also pointed out that central banks need to collaborate with other financial authorities to effectively deal with financial stability concerns over non-financial corporate and informal market borrowing by households.

In the same panel, one panellist stressed the importance of understanding better the interaction of macroprudential policy and monetary policy, of identifying financial stability risks from a greater role of non-bank financing and of promoting coordination among banking, insurance and securities regulators. Finally, another panellist explained the similarities between monetary policy and macroprudential policy in the sense that both affect the choices by borrowers, creditors and financial intermediaries. He also pointed out that since 2002, the policy rates of both AEs and EMEs have remained significantly below the level prescribed by the Taylor rule.

Programme

Session II   Chair: Jessica Chew (Assistant Governor, Bank Negara Malaysia)

15:20–16:40   Paper 3:
"Capital structure in emerging Asia"
Vidhan Goyal (Hong Kong University of Science and Technology)
and **Frank Packer** (BIS)

Discussant: Dragon Yongjun Tang (University of Hong Kong)

16:40–18:00   Paper 4:
"Foreign banks and credit conditions in EMEs"
Patrick McGuire and **Torsten Ehlers** (BIS)

Discussant: Glenn Hoggarth (Bank of England)

18:30   Conference dinner hosted by Muhammad bin Ibrahim (Governor,
Bank Negara Malaysia)

18 October 2016, Tuesday

08:15–08:30   Welcome coffee

Session III   Chair: Eli Remolona (Chief Representative, BIS Representative
Office for Asia-Pacific)

08:30–09:50   Paper 5:
"Household credit in Asia and the Pacific"
Moritz Schularick (University of Bonn) and **Ilhyock Shim** (BIS)

Discussant: Woon-Gyu Choi (International Monetary Fund)

09:50–11:10   Paper 6:
"Rich debt, poor debt: assessing household indebtedness and debt
repayment capacity"
**Lau Chin Ching, Lim Sheng Ling, Muhamad Shukri Abdul Rani,
Siow Zhen Shing** and **Siti Hanifah Borhan Nordin** (Bank Negara
Malaysia)

Discussant: Sock-Yong Phang (Singapore Management University)

11:10–11:30   Coffee break

11:30–12:50   Policy panel on "Balancing policy objectives in Asia: leverage vs
long-term economic growth"

Chair: Nor Shamsiah Mohd Yunus (Deputy Governor, Bank
Negara Malaysia)

Panelists: Deepak Mohanty (Executive Director, Reserve Bank of
India)
Johnny Noe Ravalo (Assistant Governor, Bangko Sentral
ng Pilipinas)
Paul Tucker (Senior Fellow, Harvard Kennedy School)
Hyun Song Shin (Economic Adviser and Head of
Research, BIS)

12:50–13:00   Concluding remarks by **Hyun Song Shin** (BIS)

13:00–14:30   Farewell lunch

List of participants

Central banks

Australia	Reserve Bank of Australia
	Malcolm Edey Assistant Governor, Financial System Group
China	People's Bank of China
	Jiang Huifen Deputy Director
Hong Kong SAR	Hong Kong Monetary Authority
	Cho Hoi Hui Division Head
India	Reserve Bank of India
	Deepak Mohanty Executive Director
Indonesia	Bank Indonesia
	Dwityapoetra Soeyasa Besar Director
Japan	Bank of Japan
	Ken Matsushita Deputy Director-General
Korea	Bank of Korea
	Ho Soon Shin Director General
Malaysia	Bank Negara Malaysia
	Abdul Rasheed Ghaffour Deputy Governor
	Nor Shamsiah Mohd Yunus Deputy Governor
	Jessica Chew Assistant Governor
	Bakarudin bin Ishak Assistant Governor
	Norzila Abdul Aziz Assistant Governor
	Madelena Mohamed Director, Financial Surveillance Department
	Aznan Abdul Aziz Director, Financial Sector Development Department
	Chin Ching Lau Deputy Director, Financial Surveillance Department

	Kue Peng Chuah Senior Economist, Monetary Policy Department
Philippines	Bangko Sentral ng Pilipinas
	Johnny Noe Ravalo Assistant Governor
Thailand	Bank of Thailand
	Don Nakornthab Senior Director
United Kingdom	Bank of England
	Glenn Hoggarth Senior Economist

International organisations and other institutions

Korea	Korea Institute of Finance
	Jae-Ha Park Senior Fellow
United States	International Monetary Fund
	Woon-Gyu Choi Acting chief, Internal Economics Unit

Academic institutions

Germany	University of Bonn
	Moritz Schularick Professor
Hong Kong SAR	Hong Kong University of Science and Technology
	Vidhan Goyal Professor
	University of Hong Kong
	Dragon Yongjun Tang Professor
Singapore	National University of Singapore
	Yongheng Deng Professor, Institute of Real Estate Studies
	Singapore Management University
	Sock-Yong Phang Vice Provost, Faculty Matters
United Kingdom	Cass Business School
	Thorsten Beck Professor
United States	Harvard Kennedy School
	Paul Tucker Senior Fellow

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Eli Remolona
Chief Representative

Madhusudan Mohanty
Head of Economics and Financial Markets for Asia
and the Pacific

Frank Packer
Regional Adviser

Ilhyock Shim
Principal Economist

Opening remarks

Abdul Rasheed Ghaffour[1]

Bismillahhirrahmanirrahim

Assalamualaikum and good morning to our distinguished speakers and participants. I am pleased to welcome all of you to Malaysia for today's research conference on "Financial systems and the real economy". I wish to take this opportunity to thank our co-host, the Bank for International Settlement (BIS), for agreeing to hold this conference in Kuala Lumpur. The theme for this conference is very appropriate given the ever-changing financial landscape. Indeed, interactions between the financial system and real economy are taking on new and broader dimensions every day. A quick online search showed a few recurring research topics by the BIS – topics including leverage, emerging market economies (EMEs) and macroprudential policy. These topics are, in fact, the main coverage of six research papers that will be discussed over these two days. I believe the selection of such topics is not purely coincidental.

I have three key messages that I wish to deliver this morning. The first is to deliberate on the **_purpose of taking on debt_**, as I believe this really matters. Globally, total credit to the non-financial private sector increased by 16 percentage points from end-2008 to reach 144% of GDP in the first quarter of 2016. This trend was more apparent for EMEs, where total credit to the non-financial private sector increased by 48 percentage points to reach 128% of GDP.

On this note, I wish to pose a question: Is increasing leverage necessarily bad? Debt, no matter what, remains the lifeblood of the modern economy, and is paramount in supporting economic growth. With debt, households and businesses are able to smoothen consumption and make long-term investment decisions. In EMEs, the increase in debt also reflects continuous financial deepening. Evidently, who takes on debt and how they use it is what really matters. This reminds me of a lesson from the subprime crisis – debt should be extended to those who have the capacity to repay, and if it serves real economic purposes.

In Malaysia, household debt remains elevated at 89% of GDP as at end-June 2016. About 58% of this is for the purchase of residential properties, which is the preferred form of long-term investment, to help finance children's education and prepare for retirement and medical costs. Another 15% of this is for the purchase of motor vehicles, which is deemed essential for work and income-generating activities, especially now, when public transportation system enhancements are underway. The bulk of the debt is granted by banks, and mainly borne by borrowers with income levels above the national average. In addition, credit underwriting and risk management practices of banks were assessed as remaining sound in an environment of a highly competitive retail financing market.

Nonetheless, excessive leverage has, in the past, placed undue stress on the global financial system and acted as a drag on world economic growth. While much debate still revolves around what constitutes excessive leverage, considerable efforts

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have been undertaken to build resilience in the financial system. Macroprudential policy is increasingly becoming an important component in the toolkit of central banks, regulators and supervisors to reduce excessive leverage and manage financial imbalances.

In Malaysia, our macroprudential policy framework is designed based on three key principles. First is the deployment of macroprudential policies, which is aimed to be pre-emptive and discretionary-based, rather than rule-based. This means that we do not set fixed threshold levels or triggers for the implementation of such policies. After deployment, we monitor the effects of such policies closely and calibrate from time to time as conditions change. This is important to ensure continued relevance and prevent "overshooting" the policy objectives. Second, we adopt a targeted approach in order to reduce unintended consequences or spillovers onto other segments. This is vital as macroprudential policies can affect financial behaviours and the wider economy. At the same time, we try to avoid designing overly complex policies that could give rise to regulatory arbitrage or circumvention, and of course, avoid confusion. Third, we typically use macroprudential tools to complement our supervisory, monetary, fiscal and structural measures to achieve greater policy effectiveness. Based on our past experiences, the greatest challenge for effective implementation is gaining policy acceptance and managing policy backlash. In addition, regulatory arbitrage needs to be actively managed to avoid shifting of risks to less regulated or unregulated sectors. In this regard, we have enhanced the governance arrangements for decision-making and mechanisms to promote effective inter-agency coordination during "business as usual" periods.

My second key message is about **_over-regulation – which to a certain extent, if not properly balanced and sequenced, can stifle economic growth_**. Let's assume our financial system is an "hourglass"; the risks within it are the sand in the hourglass; and the act of turning the hourglass symbolises actions to mitigate such risks. If not careful, turning the hourglass too soon – in the context of financial regulations – could affect the ultimate objective of promoting sustainable long-term economic growth. This is what we saw in the aftermath of the global financial crisis, where a wave of regulations were established and implemented to strengthen the safety and soundness of the financial system to withstand potential shocks. While these efforts are certainly important and are welcomed globally, some question the suitability of such regulations if applied uniformly across advanced economies (AEs) and EMEs. On this note, I wish to pose a second question: When would regulations become too expensive?

One of the unintended consequences of the global reforms is the decline in correspondent banking relationships. In recent years, we have seen de-risking actions taken by banks in AEs. This has resulted in the withdrawal of correspondent banks in smaller EMEs across the regions of Africa, the Caribbean, Central Asia, Europe and the Pacific. For regions that are dependent on correspondent banking, this has disrupted financial services and impeded trade-related transactions and remittances. Some have even opined that this is a result of more rigorous prudential and tax transparency requirements, as well as heightened compliance costs from regulations on combating money laundering and the financing of terrorism.

While the financial system may be safer with the floodgates closed, concerns are now being raised about whether the trend could drive financing activities towards the shadow banking system. In this regard, EMEs and AEs have been supporting the concept of proportionality in regulations. This essentially means that regulations

should be commensurate with risks, and the cost of regulations should also be proportionate to the benefits. In achieving proportionality and the intended outcomes of the regulations, it is important that we do not abandon the wider objectives of growth, stability and inclusion.

Let me now move on to my third key message, which is about **_the need to embrace innovations for sustainable growth_**. Historically, the banking industry has been resilient to disruption by technology. Arguably, this could be attributed to protective regulations that seem to favour formal banking, and sticky consumer behaviour. This may now be changing. Given the expanding needs of the economy and increasing regulatory requirements, the traditional banking industry may not always be able to cater to the needs of all segments. The rise of the "not-so-new kid on the block", financial technology or fintech, is pushing new frontiers in banking. Fintech advancements play an important role in reshaping behaviours of businesses and consumers. Innovations, in areas such as microfinance, remittances and crowdfunding, are providing consumers with greater and cheaper funding alternatives. For banks, fintech could boost profits by allowing speedier settlement and better capital allocation. Fintech could also play a significant role in addressing the aforementioned correspondent banking issue. While fintech holds boundless potential, it is not without associated risks. It could potentially lead to excessive debt accumulation, particularly in segments where underwriting and risk management standards are relatively untested. Similarly, fintech is also subject to consumer market conduct and protection issues, fraud and cyber risks and money laundering concerns.

On this note, I wish to pose a third and final question: Should we fight or embrace such innovations? This time, I will attempt an answer. Efforts to push back this wave of change may likely be futile, given that global and domestic financial systems and economies are now highly integrated. Policymakers can play a strategic role in embracing such innovations and steering them towards sustainable growth. In Malaysia, the central bank has issued a discussion paper to introduce a sandbox approach that allows companies to experiment with fintech solutions in a controlled and live environment, with appropriate safeguards in place. The framework is expected to provide regulatory clarity to fintech companies while emphasising the need for innovations that contribute positively to the public interest and real value creation.

Allow me to conclude, ladies and gentlemen, that while we focus on trying to achieve an optimal policy balance, new waves of change are now lapping on our shores. I hope that this conference will serve as a useful platform to discuss these changes and the appropriate policy responses. I also hope that you will have the opportunity to enjoy the diverse Malaysian culture, food and sights during your stay in Kuala Lumpur.

On that note, thank you!

What is macroprudential policy for? Making it safe for central bankers

Paul Tucker[1]

Thank you very much for inviting me to this conference on central bank macroprudential policy. Most of the agenda is, rightly, devoted to the scientific study of interactions between the financial system and the macroeconomy, and to how policy might be able to provide a more secure base for private economic activity. I am going to step back from that to ask questions about the financial stability policy regimes that are emerging around the world. Do we even have clarity around what 'macroprudential policy' is for?

That question is rarely asked, even as 'macroprudential' has become the topic de jour amongst central bankers. If only everyone had heeded Andrew Crockett, the former leader of the Bank for International Settlements who, in one of many important contributions, reintroduced the term in the early 2000s, the Great Financial Crisis could have been avoided, or so the refrain goes. There is something in that. Certainly, it would have been a good idea if banks had had more equity. One of many problems with this turn of events, however, is that, somehow, it has left everyone free to fill in the largely blank macroprudential canvas to suit their own tastes, beliefs and, perhaps most of all, interests. Thus, from being a moment for refocusing on the resilience of the system, it risks becoming a vehicle for macroeconomists to invent a new set of instruments for themselves to research and use.

I have argued elsewhere that, given the state of knowledge, the priority should be resilience. I will reprise some of that here, but by way of urging the central banking community not to become too powerful. Put another way, the short-term attractions of accepting greater power in order to do good while other possible actors wait on the sidelines should be subordinated to the longer-term interest – of society, as well, more narrowly, as of central bankers themselves – of holding onto independence.

It is a timely caution because, at least in the West, threats to central bank independence are emerging for the first time in around a quarter of a century. I will start by enumerating just of a few of those challenges, which are a reminder that unelected power insulated from the politics of government is a delicate matter. I will then sketch the outlines of an approach to framing stability regimes, and to choosing whether to rely on regulatory policy or balance sheet operations. The analysis risks being the product of Western economic circumstances and democratic values. I conclude, therefore, with a few thoughts on how the conditions of emerging market economies challenge to my preferred approach, and how they might be addressed by a regime of 'whole-economy macroprudential policy' under the control of politicians.[2]

Four of the challenges to central bank independence

In the wake of the crisis and the painfully slow and uneven recovery that has followed, four of the broad issues confronting the current status and scope of independent central banks are:

- That monetary policy might, after all, involve long-term trade-offs and so political management needs to be reintroduced;

- That monetary policy is having big distributional effects, again requiring political input;

- That the results of central bank policy are not living up to their billing and prestige as *The Only Game in Town*; and

- That central banks are *Over-Mighty Citizens*, insufficiently constrained and too broadly empowered.

    A few words on each, including contrasts and comparisons with stability policy.

Non-neutrality: hysteresis and trade-offs

A central tenet of monetary economics is that money is, in the jargon, neutral and even super-neutral – which is to say that increasing the amount of money in the economy does not create more output and employment in the long run, and that increasing the growth rate of money simply translates into a higher steady-state rate of inflation.

    While that has long been contested by commentators on the Left, recently some prominent US-based mainstream academic economists have begun to argue that monetary policy could (and should) be used to combat longer-run hysteretic effects of massive shocks to the economy.[3] In a nutshell, the proposal is to run what Janet Yellen described (before the 2016 US general election) as a "high pressure economy" in an attempt to recover lost ground and to restore something like the pre-crisis normality.[4]

    Whether to do so would have to be weighed against the risks of rekindling inflationary expectations or of triggering a renewed wave of financial sector improvidence. The big question, however, which tends to be left hanging in the air, is who should make the decision whether to persist with a high-pressure policy. Can it be left to unelected technocrats?

    It seems likely that the possibility of hysteresis persistently depleting economic capacity has little or no bearing on the familiar inflation bias of monetary policy under day-to-day political control. That makes a case for monetary policy remaining with

Accountability and International Coordination". CIGI Essays on International Finance, volume 3, Waterloo, ON: CIGI, 2016.

[3]   O Blanchard, E Cerutti and L Summers, "Inflation and Activity: Two Explorations and Their Monetary Policy Implications," Working Paper Series, WP15-19, Peterson Institute for International Economics, 2015.

[4]   J Yellen, "Macroeconomic Research After the Crisis", speech delivered at the 60th annual economic conference on "The Elusive 'Great' Recovery: Causes and Implications for Future Business Cycle Dynamics", sponsored by the Federal Reserve Bank of Boston, Boston, Massachusetts, 14 October 2016.

central banks. It also implies, however, that an independent monetary authority should have discretion to run a "high pressure economy" only if medium- to long-term inflation expectations remain in line with the target for inflation.

Contrast that with stability policy. No one in the mainstream is suggesting that looser monetary policy (and so higher inflation) in n years' time would generate more economic activity or welfare. By contrast, it is possible that a much tougher regulatory regime – one that, say, banned maturity transformation or leverage – might affect the dynamism and efficiency of the economy. We just do not know. This has major implications for how the goals of stability policy should be framed.

Distributional considerations

A second challenge to post-crisis central banking has been more overtly political, not in the sense of straightforward party politics but in the sense of particular parts of society being either systematic winners or systematic losers from monetary policy since 2009. In a number of countries, perhaps particularly Germany and the United Kingdom, it is argued that a combination of persistently low official interest rates with quantitative easing and credit easing – prosaically, buying lots of government bonds and privately issued bonds – has pushed up asset prices, enriching the rich, and pushed down returns on savings, hurting those households and pensioners who are not remotely rich but who rely on income from a lifetime of saving. Since democratic politics is the forum in which sectional interests and preferences are debated and settled, this invites the protest that central banking has found itself stranded in foreign territory, losing its legitimate moorings.

There is no doubt that monetary policy has been having distributional *effects*. When a central bank raises interest rates to restrain demand, there will typically be some cost to debtors and asset holders and some uplift in the running return to savers. In normal circumstances, those effects are dominated for society as a whole by the benefits of maintaining sustainable growth and, separately, over time they tend to be offset by the obverse effects that kick in during periods of easy monetary policy. The distinctive thing about the current conjuncture is that super-low interest rates and asset purchases have gone on and on for years and years, so the distributional effects have been more pronounced and long-lived. Given the different tendencies to vote of the segments of society affected, it is not hugely surprising that these effects should prompt public debate and some disquiet.

For my theme today, the key thing here is that, give or take a bit, monetary policymakers were not, on the whole, making distributional *choices* when they kept their policy rate low and injected money by buying low risk government bonds. Contrast that with introducing limits on the access of households and businesses to particular products in order to quell a boom. In that case, the authorities could instead have raised equity requirements for banks and other intermediaries. A choice of who is constrained *is* being made.

The Only Game in Town: central banking as false hope

Things start to come together in the third concern: that central banks have become the only game in town, but cannot deliver what the people want. The roots of this problem are deep, and alarming.

There exists a strategic tension between central banks and elected policymakers. The latter have few constraints on their powers but carry equally few legal obligations. In consequence, when short-term politics entail costs on acting themselves to contain a crisis or bring about economic recovery, they can sit on their hands safe in the knowledge that their central bank will be obliged by its mandate to try (within the legal limits of its powers). That can lead to a flawed policy mix, creating risks in the world economy and financial system. Central banks are, in effect, faced with a choice between implementing a flawed policy and abandoning their mandate in order to induce others to act.

At times, the Bank for international Settlements, the central bankers' bank and refuge, has got close to advocating the latter course. This has been irresponsible, not least because it has risked obscuring the important (and true) message that the heavy lifting of sustainable economic recovery is unavoidably in the hands of the governments, since only they can remove obstacles to greater dynamism in the supply side of the economy.

Constrained by law and democratic mandate to do as much as they can within their powers, central banks have ended up looking like something they are not: *the* macroeconomic policymakers. The upshot has been a central banking community that is liable to be held responsible for something it simply cannot deliver: prosperity. The only answer in the short term is for central bankers to get back to repeating, over and over again, the refrain of the 1990s: that they can buy time but cannot generate prosperity.

That fundamental truth is not diluted by the grant of new macroprudential and regulatory powers. Indeed, the expansion of responsibilities and instruments risks fuelling the perception that central bankers are the miracle workers of our time, which brings me to the core of my remarks.

Over-mighty citizens?

In the decade or so before crisis broke in the summer of 2007, central banks' core objectives and functions seemed settled: price stability and monetary policy. But, as Paul Volcker had warned emphatically as the 1990s began, no good could come from the central banking community losing interest in or influence over the financial system. Disaster duly followed when they became, by doctrine, inclination and expertise, overly detached from the need for financial system stability.[5] The post-crisis reawakening to the significance of most monetary liabilities being issued by private businesses has prompted extensive regulatory reforms. They have left many central banks with powers and prestige not seen since the 1920s, if then.

The issue this will pose sooner or later, perhaps particularly in democratic societies, is whether central banks risk becoming *over-mighty citizens*, too powerful, essential or prestigious to be constrained. In democracies, that would be a disaster. Everywhere, it would leave central banks hostage to shifting expectations and standards: moving goal posts.

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[5]   Paul A Volcker, "The Triumph of Central Banking?", Per Jacobsson Lecture, Washington DC, 23 September 1990. The presence of the question mark was underlined during Q&A.

Macroprudential regimes: purpose and objective

In the monetary sphere, we have, at least, got used to central banks being constrained by a purpose (price stability) which enjoys broad support and an objective (typically, today, an inflation target) which is easily understood and monitored. In the macroprudential sphere, that base camp has not been reached.

Let me give you some European and global examples. When, over the past year or so, the European Commission (usefully) consulted on the EU's macroprudential framework and institutions, nothing was said (as far as I could see) about purposes, beyond the vague term 'financial stability'. When the European Systemic Risk Board and the G20 Financial Stability Board each published documents on financial stability, they were, by contrast, clear about the purpose (a resilient financial system) but similarly silent on objectives, or indeed on the need for a monitorable objective.

Meanwhile, much of the macro-finance research community is devoting effort and ingenuity to studying the 'effectiveness' of macroprudential instruments. One might reasonably ask, effective at what? That, by and large, is passed over in silence.

Two types of social cost

In headline terms, we can think of the proverbial 'boom and bust' as bringing social costs of two broad kinds:

1) A misallocation of resources and, in particular, over accumulation of debt during 'booms', which matter whether or not boom ends in 'bust'.

2) A collapse in asset values and a withdrawal or severe tightening of the supply of essential financial services following crises, which together bring about a macroeconomic downturn.

Both are products of negative externalities. The private costs of financial system pathologies fall well short of their socially destructive costs, so society cannot sit back and rely on private virtue or prudence to ensure allocative efficiency or intertemporal stability. Nor have we found a way of reframing property rights that leaves financiers unambiguously incentivised to weigh the social costs of their choices and actions.

Beyond that, our understanding of the two types of social cost diverges. We know very little about how to recognise booms or the associated misallocation of resources. We do know something about avoiding the costs of 'bust'. Big picture, five things can be said:

• Equity capital absorbs losses without the dislocations entailed by a bankruptcy procedure, whereas debt does not;

• A shortage of liquidity or an erosion of equity in levered intermediaries prompts a fire sale of assets and contagion to other intermediaries;

• Those vulnerabilities, while canonically associated with banking, are not in themselves connected to legal form;

• The social costs of failure tend to be smaller if interlinkages amongst firms are fewer; and

• Social costs of failure are smaller if core services can be maintained by (a) resolution regimes, and (b) low barriers to entry.

The de facto purpose: financial system resilience

Conscious of their ignorance of what drives booms and believing the social and political costs of the system collapsing are especially great, policymakers have, rightly in my view, concentrated on mitigating busts. Further, whereas previous generations concentrated almost exclusively on reducing the *probability* of failure, policy in the aftermath of the Great Financial Crisis has put as much weight (almost) on reducing the *impact* of failure.[6]

The implicit judgment is that a resilient system would be less likely to collapse and, crucially, in the event of crisis would be better at resuming the provision of core services, which would reduce the severity of the economic downturn and place less reliance on macroeconomic policy to generate recovery. That last point is important for where I am going.

The proposed objective: a quantified Standard for financial system resilience

If the purpose is continuity of services from the system as a whole, and thus avoiding the worst costs of 'bust', the core objective of the regime must be a *Standard of resilience*. That is to ask, just how resilient should the system be?

Roughly speaking, policymakers need to determine the severity of shocks the system should be able to withstand. That is driven by three things:

(a) A picture (or model) of the structure of the financial system through which losses or shocks are transmitted around the system and via which substitute service-providers emerge;

(b) A view of the underlying stochastic process generating those shocks/first-round losses; and

(c) A tolerance for systemic crisis.

While all three are unavoidably part of the make-up of those existing regulatory regimes, such as the Basel III Accord for banks, designed to ensure resilience, they have tended to be implicit. I am arguing that they should be as explicit as possible, in the interests of both effectiveness and legitimacy.

That legitimacy is at stake can be seen by observing that the three components are different in kind. Inputs (a) and (b), the model/picture of the system and of the loss-generating process, are properly objects of scientific inquiry. But input (c) is different, as society's tolerance for systemic risk needs, somehow, to reflect a view of the people's preferences.

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[6] The substance of the reform programme was outlined and evaluated in Paul Tucker, "Regulatory Reform, Stability, and Central Banking", Hutchins Center on Fiscal & Monetary Policy, Brookings, 16 January 2014. One conclusion of that paper was that policymakers lacked a framework for the resilience of key markets. They still do.

As alluded to earlier, this marks an important difference from monetary policy, because we do not yet know whether there are serious long-run trade-offs.[7] For that reason, a goal of systemic stability is not quite the same as the established goal of price stability. Some residual risk of instability is tolerated (even when the regime is working as intended). Politicians must decide how much, either formally issuing or blessing the Standard of resilience that the financial stability authorities are required to apply. Reflecting cross-border interlinkages and spillovers make financial system resilience a global common good, something like that happened when a G20 Leaders' summit signed off the post-crisis Basel standard.[8]

Unpacking 'tolerance for crises' in current macroeconomic circumstances

Of course, crisis/non-crisis is not binary but rather, if I might be excused a European metaphor, akin to Dante's Circles of Hell. 'Tolerance for crisis' should, therefore, be thought of as a vector covering the tolerance for a series of calamitous states of the world, including all core services ceasing and, less devastating, severe impairment of each broad type of core service (payments, credit, risk transfer and insurance).

The macroprudential turn, Andrew Crockett's insight, means that when applying the Standard, technocrats need to have a deep understanding of, in line with (a) above, the structure of the financial system: specifically, how viciously or mildly shocks are propagated, and how easy or hard it is for new entrants to substitute for failed or badly distressed firms. This means taking into account the following areas of public policy (which, other than the first, lie beyond central banking):

- The risk-sharing and allocation properties of the financial infrastructure;

- Policies on the structure of the industry, since they too materially affect interlinkages;

- Policies on competition, since they affect barriers to entry and so how readily the provision of services can revive; and

- The adequacy of macroeconomic institutions and, in particular, the fiscal framework and the flexibility of product and labour markets, since they affect how easily or not shocks to the economy are absorbed, and thus, the final incidence of losses to intermediaries.

The last consideration is important but, I suspect, uncomfortable. Here in Asia, it is probably one of the reasons authorities have elected to require banks to hold capital above the international minimum standards. Sadly, I do not see much recognition of it in Europe, where market inflexibility and a radically incomplete macroeconomic constitution in the euro area point towards banks carrying more, not less, equity: the opposite of what we read is going on in the Basel negotiations to complete the capital accord.

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[7]   For a comparatively rare paper exploring possible long-run trade-offs, see R Ranciere, A Tornell and F Westerman, "Systemic Crises and Growth", *The Quarterly Journal of Economics*, vol 123(1), February 2008, pp 359–406.

[8]   Paragraph 29 of the communique of the G20 Seoul Summit, November 2010.

Higher equity needed today to meet the Standard

In today's macroeconomic circumstances, however, that is not just a point for Europe or for some emerging market economies (EMEs). It is universally valid. No one knows when the next recession will come, but come it will. When it does, monetary policymakers will have less scope to cut policy rates and fiscal policymakers less scope to provide stimulus than they did during 2009. That being so, an unchanged Standard of resilience (tolerance for crisis) entails higher equity capital ratios than warranted in more normal circumstances.

That is a macroprudential policy for today. It ought to be pushed by the IMF, and actively discussed in Basel. When the current minimum standards were calibrated, no one was thinking interest rates would still be at or even below zero as the transition period for the new Accord was nearing its close. Certainly, whenever intermediaries are unusually profitable, retentions should, for the moment, be the order of the day.

Macroprudential policy and central bank balance sheet operations

I want to return to where we began, the broad question of what macroprudential regimes should look like. I have proceeded as though they begin and end with regulatory policies of various kinds, but not a few economists, commentators and even central bankers themselves entertain the possibility, or in some cases push the idea, of using balance sheet policy for macroprudential ends.

At the level of political economy, the differences between regulatory policy and balance sheet policy are striking:

- *Regulatory policy*: subject to public consultation; might take time to finalise; open to challenge in the courts; and

- *Balance sheet policy*: rapidly agreed and effected; less likely to be challenged in the courts; subject to political oversight via hearings in the legislature; exposes the state to fiscal risks.

Balance sheet operations typically also target a different (intermediate) objective. Take the idea of selling a portfolio of mortgage-backed bonds to suppress exuberance. This does not work on the resilience of intermediaries directly. It is better thought of as trying to manage, even if only rough-tune, credit conditions. For the reasons given earlier, I think policymakers insulated from day-to-day politics would do better to focus on an objective that is more easily monitored (and, via independent stress testing, evaluated).

There is another way of getting to the same conclusion. In their attempts to revive economic activity and so achieve their inflation targets, central banks have been intervening in markets to compress risk premia, not just during the period of panic when they were too high but up to today.[9] If, then, they were ever to intervene directly

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[9]   To be clear, I was very much part of that from 2009 to 2013, and in 2004 spoke about it as an option that would be available at the zero lower bound. See P Tucker, "Managing the Central Bank's Balance Sheet: Where Monetary Policy Meets Financial Stability", Bank of England, *Quarterly Bulletin*, Autumn 2004.

in markets to push risk premia up to levels they thought warranted by fundamentals, they would face a difficult choice:

- Either central banks should operate in markets only to get risk premia back in line with (their judgment of) fundamentals; or

- If, when their risk-free policy rate is constrained at the zero lower bound, they are going to push premia below fundamentals to help support economic activity, they should not also exercise a right to keep premia in line with fundamentals at other times.

I say that because otherwise it will be almost impossible for politicians and the public to keep track of what central banks are doing and why they are doing it. The mandate becomes an unconstrained licence to do good. For balance sheet policy, the priority should be to re-establish confidence in the integrity of the lender of last function.[10]

Missing regimes: a particular problem for EMEs

I have been advocating a setup where, at current levels of knowledge, stability policy should be directed at financial system resilience, not at managing credit conditions, and where balance sheet policy should be parsimonious. Also, although I shall not defend it here, I prefer monetary policy to stick to the job of maintaining nominal stability over the medium to long run.

I do not pretend that that is all society might need. Indeed, a need can be identified for at least five regimes:

- Nominal stability: monetary policy

- Financial system resilience: prudential policy (micro and macro)

- Internal macro-financial balance: ?

- National balance sheet vulnerabilities: ?

- International macroeconomic balance: ?

Surely, we have seen enough over the past 30 years to be left with an uncomfortable feeling that the first two regimes, however well designed and operated, are unlikely to suffice. In medium-sized EMEs with open capital markets, raising interest rates to lean against excess aggregate demand growth can act as a magnet for hot money, pushing up asset prices, easing credit conditions, and fuelling internal and external imbalances.

Guarding against external imbalances is a form of national balance sheet management or, if you prefer, 'whole-economy macroprudential policy'. So far as I know, we do not yet have an articulation of how such policies could be framed within a coherent regime, a pre-condition for delegation to (unelected) officials insulated from day-to-day political currents. Maybe the proper – or, more narrowly, safe – role

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[10]   P Tucker, "The Lender of Last Resort and Modern Central Banking: Principles and Reconstruction", *BIS Papers*, no 79, 2014.

for central banks in this field is to act as independent advisors, publishing their advice to political policymakers on external vulnerabilities.

Better still would be for central banks to work on the design of such regimes, with a clear purpose and transparent monitorable objective. EME central banks are in a good position to lead on this, with the West importing the ideas. Because, be in no doubt, the West too needs regimes for managing external imbalances and vulnerabilities in ways that serve the collective interest.

Summing up

Thank you again for inviting me to this conference. My messages, for what they are worth, are simple. Do not be too ambitious with macroprudential regulatory policy, tempted by the over-ambitious goal of 'managing the credit cycle'. Ensure, instead, that financial systems are resilient. Use balance sheet operations to deliver nominal stability and in the inalienable role as liquidity reinsurer of last resort. Face up to the pressing problem of missing regimes. For the world, that last part is worrying. For EMEs, it offers an opportunity to provide intellectual and practical leadership.

Credit growth and macroprudential policies: preliminary evidence on the firm level[1]

Meghana Ayyagari,[2] Thorsten Beck[3] and Maria Soledad Martinez Peria[4]

Abstract

Combining data on 1.3 million firms from 2002 to 2011 operating in 59 countries with changes in macroprudential regulations over this period, we find some evidence that macroprudential policies are associated with lower credit growth, especially for small firms with limited non-bank financing. We also find an impact of macroprudential policies on young firms in emerging markets. Our results point to an important trade-off in financial stability and financial deepening.

Keywords: financial development; macroprudential policies; firm financing

JEL classification: E44, E58, G18, G28

1. Introduction

The trade-off between financial development and stability has dominated academic and policy debates alike, especially in the wake of the Global Financial Crisis (GFC). On the one hand, an extensive literature has documented that small firms are especially financially constrained with negative repercussions for overall economic development (eg Fazzari et al (2000); Beck et al (2005, 2006)). Easing these financing constraints and thus improving resource allocation and, ultimately, economic growth in an economy requires more efficient financial intermediation and financial deepening. On the other hand, the GFC has reinforced the need to reign in credit cycles, which can turn credit booms into credit busts and banking and economic crises (Claessens et al (2011)). Macroprudential tools, utilised for many decades and the focus of increased attention in the post-crisis regulatory reform debate, are designed increase the resilience of financial institutions and borrowers to aggregate shocks, and to contain excessive growth in credit intermediation from procyclical feedback between credit and asset prices (IMF, 2013).

This paper is a first attempt at assessing the effectiveness of macroprudential policies and their impact on firms, thus assessing a potential trade-off between stability and development objectives. Specifically, we document cross-country variation in credit growth over the past decade and examine the relationship between macroprudential policies and the growth in short-term versus long-term debt of firms, controlling for the monetary policy stance, other macroeconomic factors and time-variant firm characteristics. We also explore if there is heterogeneity in this relationship across different types of firm according to their age and size and macroprudential instruments (borrower-targeted versus financial institution-targeted). In exploring the relationship between firm financing and macroprudential tools, we combine firm-level data on more than 1.3 million firms between 2002 and 2011 in 59 countries with detailed data on the use of 12 different types of macroprudential policy instrument in these countries.

We find substantial variation in financial development and credit growth across countries. Specifically, we document a sustained increase in *private credit to GDP* across countries of all income levels in Asia over the past decades. When assessing the relationship between macroprudential regulatory tools and firm financing, we find some evidence that macroprudential policy matters, especially for smaller firms with limited non-bank financing sources. In the overall sample, we find only that the index of borrower-targeted macroprudential policies is negatively associated with growth infirm financing. When we focus on small firms with fewer than 10 employees, we see that both borrower and financial institution targeted macroprudential regulations are negatively associated with growth in short-term debt and overall debt, whereas only borrower-targeted macroprudential policies are negatively associated with growth in long-term debt. While in advanced countries, it is mostly the smaller firms that are affected by macroprudential policies, in emerging markets it is both small and young firms that are affected. In addition, in emerging markets, it is mainly borrower-related macroprudential tools that seem to work, while in advanced countries, both borrower- and bank-related macroprudential tools seem to be effective in reducing firm credit growth. Overall, we find that macroprudential policies targeting borrower leverage are more effective than policies targeted at financial institutions, especially in emerging markets.

Our paper relates to several strands of literature. First, it relates to a literature on firm financing that has documented the importance of financing constraints for firm growth but also the differential effect that such financing constraints have across firms of different sizes and ages. Using either Tobin's Q model or the Euler equation of investment, an extensive literature has documented financing constraints, especially among smaller and younger firms by showing a higher investment-cash flow sensitivity for these firms (Fazzari et al (2000); Abel (1980)). While most of this earlier literature has used information on larger, listed firms, a more recent literature using firm-level surveys has shown that smaller firms are more likely to report financing obstacles and are more constrained in their growth by such obstacles (Beck et al (2005, 2006)). In our analysis, we use firm-level balance sheet data from a broad cross-section of both listed and private firms, ranging across different size and age groups using the growth of debt as an indicator of access to financing.

Second, our paper builds on and contributes to a small but rapidly expanding literature on the effects of macroprudential policies. The micro-level evidence is rather limited and ours is one of the first papers to document the impact of a wide range of macroprudential policies on firm-level credit growth across a number of countries. The most comprehensive of these studies and the one most closely related to our paper is Cerutti et al (2015), who document the use of various macroprudential policies in 119 countries over the period of 2000–13. In a cross-country setting, they show that usage of borrower-based policies and financial institutions-based policies is associated with lower growth in credit. Claessens et al (2013) use balance sheet data of individual banks in 48 countries over 2000–10 to show that borrower-based measures, such as loan-to-value (LTV) and debt-service-to-income (DSTI) caps, and credit growth and foreign currency lending limits, are effective in reducing the growth in banks' leverage, asset and non-core to core liabilities. Akinci and Olmstead-Rumsey (2015) record the tightening and easing of macroprudential policies every quarter from 2000 onwards in 57 countries and show that these policies are used in tandem with bank reserve requirements, capital flow management measures and monetary policy. Lim et al (2011) study a smaller subset of 49 countries and find that macroprudential policies are associated with reductions in the procyclicality of credit and leverage.

Empirical studies have also focused on specific regions. Zhang and Zoli (2014) study Asian banks to show that macroprudential policies restricted the supply of credit from Asian banks. Bruno et al (2016) study Asia-Pacific economies and Tovar et al (2012) focus on Latin America. Both papers show that macroprudential instruments play a complementary role to monetary policy. Vandenbussche et al (2015) study the impact of macroprudential policies on housing prices in central, eastern and southeastern Europe. Country-specific studies include Igan and Kang (2011) and Bruno and Shin (2013) on Korea; Vargas et al (2010) on Colombia; Glocker and Towbin (2012) on Brazil; and Saurina (2009) and Jimenez et al (2013) on Spain.[5]

The remainder of the paper is structured as follows. Section 2 presents cross-country indicators of credit growth and macroprudential policy tools, both in global comparison and focusing on Asia. Section 3 presents initial findings on the relationship between macroprudential regulation and firm financing. Section 4 concludes.

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[5]   See literature reviews by Galati and Moessner (2011) and Claessens (2014).

2. Credit growth and macroprudential policies

To document trends in financial development both across countries and over time, we use aggregate *private credit to GDP*, which is the total outstanding claims of financial institutions on domestic non-financial enterprises and households, relative to economic activity, from the World Bank's Global Financial Development Database. An extensive literature has documented the positive relationship between *private credit to GDP* and economic growth (eg Beck et al (2000)), although the relationship is non-linear (eg Arcand et al (2015)) and high credit growth has also been shown to be a good crisis predictor (eg Demirgüç-Kunt and Detragiache (2005)).

Figure 1 shows the median value of *private credit to GDP* between 1980 and 2014 across the following four groups of countries: (i) high-income, (ii) upper-middle income, (iii) lower-middle income and (iv) low-income. We see a rapid increase in *private credit to GDP* in high-income countries, especially in the 2000s, followed by a retrenchment after the GFC. Similarly, both upper- and lower-middle income countries have seen a sustained increase in *private credit to GDP* since the early 2000s, while there has been little change in the median low-income country.

Private credit to GDP over time, across income groups · Figure 1
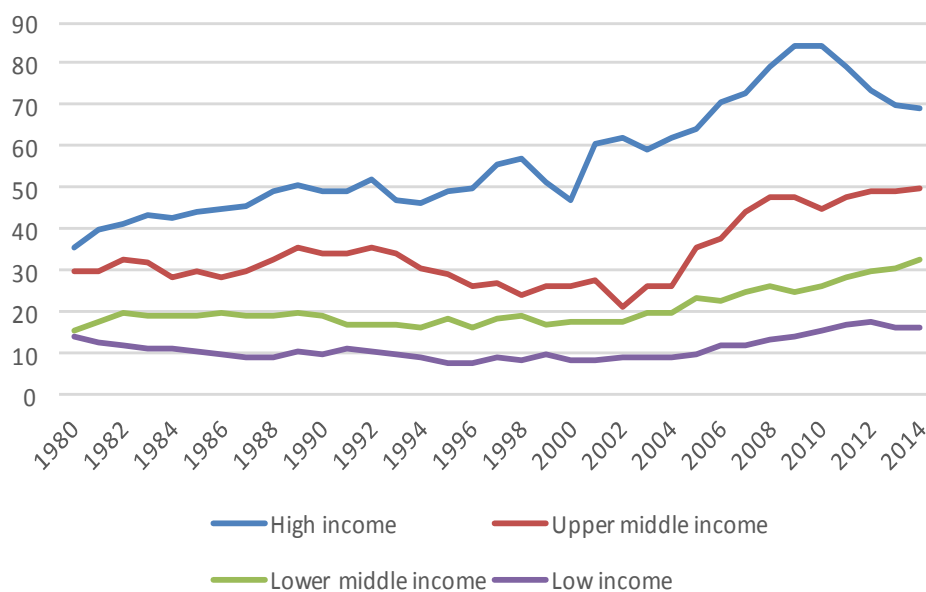
Source: Authors' calculations, based on Global Financial Development Database.

Figure 2 shows the development of *private credit to GDP* across the four income groups in Asia. Compared with global medians, all four income groups in Asia have seen a sustained increase in *private credit to GDP*, most impressively the high-income group. High-income countries in Asia did not suffer from a retrenchment after the GFC. The median low-income country has by now a higher *private credit-to-GDP* ratio than the median lower-middle income country.

Private Credit over time in Asia
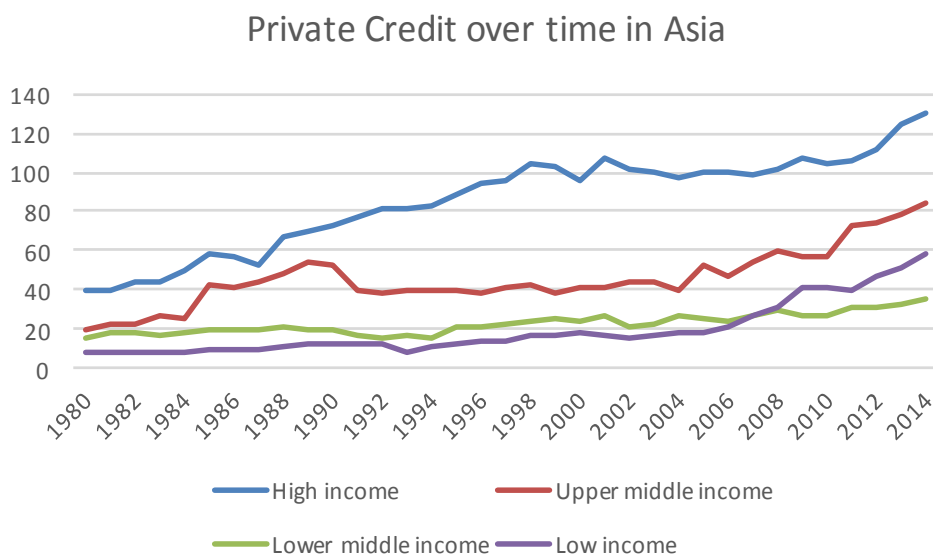
Source: Authors' calculations, based on Global Financial Development Database.

While macroprudential tools have been used for many years across the globe, they have received renewed attention after the GFC. Many Asian countries, on the other hand, have been using macroprudential regulatory tools for many years. Partly, this can be explained by a history of financial repression, as some of these tools (eg reserve requirements, lending caps) can be used both for allocative purposes and for stability objectives. For example, both Hong Kong SAR and Korea have been using loan-to-value caps to mitigate excessive housing price cycles.

The case for macroprudential policies rests on (i) the notion that a high correlation in performance across financial institutions results in contagion effects which can cause idiosyncratic distress to become systemic, and (ii) the potential that strong credit cycles might not only exacerbate business cycles, but also lead to systemic banking distress. In the broadest sense, one can distinguish between a cross-sectional dimension of macroprudential tools (ie higher capital requirements or regulatory restrictions on institutions whose failure would have a stronger negative impact on the overall financial system) and the time-series dimension, which aims at smoothing credit cycles and reducing the impact of such credit cycles on bank solvency.

As in the literature analysing the transmission and impact of monetary policy, assessing the impact of macroprudential policy presents several problems. First, macroprudential policies are endogenous to credit cycles. In particular, macroprudential policies should be observed to tighten during credit booms, and hence, the resulting reverse causation will bias downwards any effect we find for macroprudential policies mitigating credit cycles. In other words, there might be a timing issue confounding the relationship between macroprudential policies and credit flows, making any causal statement difficult. Second, we have to disentangle demand from supply of credit, as changes in macroprudential policies might affect both the demand and supply of credit. Third, changes in macroprudential policies might come about at the same time as changes in other policies, most prominently

monetary policy. Using micro-level data allows us to control to some extent for these different challenges.

To document the use of macroprudential regulatory tools and relate them to firm-level financing growth, we make use of the Global Macroprudential Policy Instruments (GMPI) survey, a recent IMF survey exercise, as described in Cerutti et al (2015). The GMPI survey is very detailed and covers 12 different instruments. We can distinguish between (i) tools targeted at borrowers' leverage and financial positions (BOR) and (ii) tools targeted at financial institutions (FIN). The former includes LTV and DSTI ratios, while the latter includes the following 10 instruments: dynamic loan-loss provisioning; countercyclical capital buffers; leverage ratio; capital surcharge for systemically important financial institutions; limits on interbank exposures; concentration limits; limits on foreign currency loans; limits on domestic currency loans; reserve requirement ratios; and taxes or levies on financial institutions. Each instrument is coded as 1 or 0 for each country-year depending on whether it was in use or not. Thus, the BOR index could range from 0 (no borrower-targeted instrument in place) to 2 (both borrower-targeted instruments in place) and the FIN index could range from 0 (no financial institution-targeted instrument in place) to 10 (all 10 financial institution-targeted instruments in place). Our third index (MPI) is the sum of BOR and FIN. Instruments are each coded for the period they were actually in place, ie from the date that they were introduced until the day that they were discontinued. While the survey captures the breadth of macroprudential policy across an array of tools and for a large cross-section of countries, it does not capture the intensity of the tools or the extent to which they were binding.

Figure 3 shows a continuous increase in the use of macroprudential tools between 2000 and 2013 across the globe, with some, rather limited, variation across income groups. Interestingly, it is the upper-middle income countries, where the use of such instruments is the most prominent, while high-income countries use, on average, as many macroprudential tools as lower-middle income countries. Low-income countries use, on average, the fewest macroprudential tools. Figure 4 shows the variation within Asia. On average, Asian countries across all income groups used more macroprudential tools than non-Asian countries, led again by upper-middle income countries and followed by low- and lower-middle income countries and high-income countries. The differences across the four income groups, however, are even smaller than across the global sample.

3. Firm financing and macroprudential policies

This section provides some preliminary evidence on the relationship between the implementation of macroprudential regulatory tools and firm financing trends. In the following subsections, we first describe our data, then discuss the methodology, before presenting some initial results.

3.1. Data

We combine a firm-level database with a data set on macroprudential policies, complementing both with other macroeconomic data. Appendix Table A1 lists the countries in our sample with the respective number of firms entering the sample.

Use of macroprudential tools across income groups

Figure 3
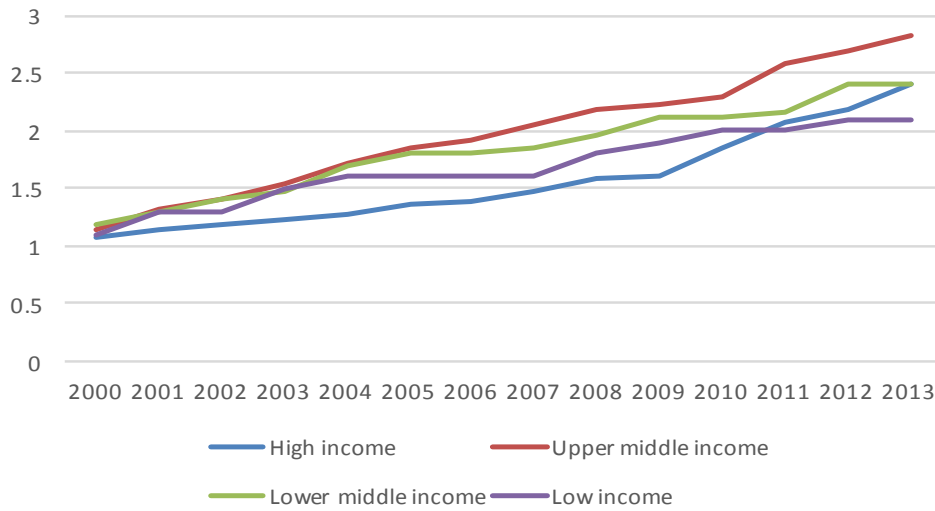
Source: Authors' calculations, based on Cerutti et al (2015).

Use of macroprudential tools in Asia

Figure 4
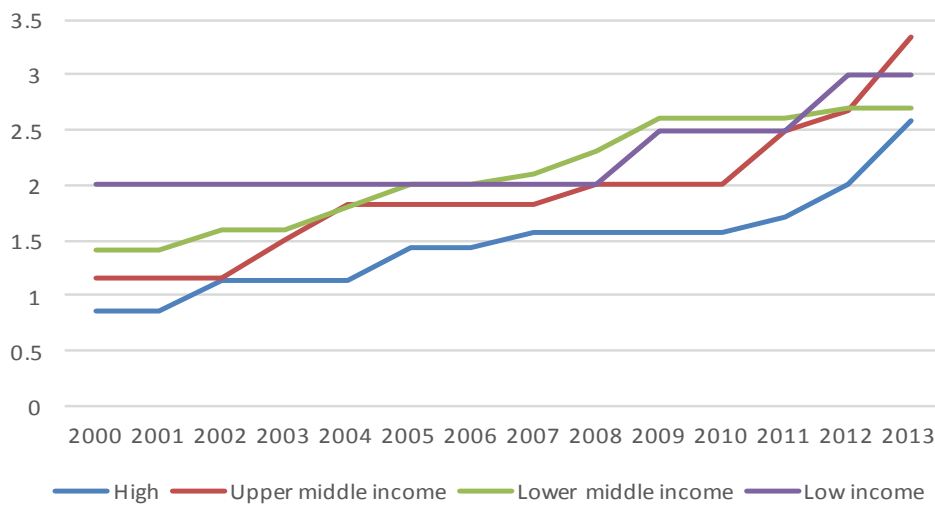
Source: authors' calculations, based on Cerutti et al (2015).

We use data from Orbis, a commercial database distributed by Bureau van Dijk containing basic firm-level information including data on external financing for over 1.3 million companies across 59 countries over the period of 2002 to 2011. Compared with other databases, the unique advantage of using Orbis is that it includes data on large and small, listed and unlisted firms. We "clean" the data in a number of ways. First, we restrict our analysis to non-financial firms and drop all duplicate observations or double reports for the same firm. Second, we only include in our sample countries that have at least 25 firms over the entire period. Third, we drop all firms that were acquirers in an acquisition deal, post-acquisition, or that merged with others following the merger since such transactions can result in sharp changes in firms'

balance sheets. Fourth, we drop observations with negative or zero values for total assets and employees.

As seen in Appendix Table A1, we have a wide variation in the number of firms across countries, ranging from 356,000 firms in France and over 180,000 firms in Italy and Spain, respectively, to fewer than 100 firms in Austria, Costa Rica, Ghana, Jordan, Morocco, New Zealand and Peru, respectively.[6] To address the unbalanced nature of our data, we weight all our estimations with the inverse of the number of firms in each country.

We construct the following financing variables: *growth in short-term debt* (with residual maturity of less than one year), *growth in long-term debt* (with residual maturity of one year of more) and *growth in total financing* (defined as the sum of short- and long-term debt), where growth is the annual growth rate, defined as the log-difference of the variable. To reduce the impact of outliers, we winsorise each dependent variable at the 5th and 95th percentiles. We then drop observations for which we do not have all three variables available to make results comparable across the three dependent variables. We then create a consistent sample across all three variables. We control for the log of total assets to account for changes in external financing due to firm growth.

The summary statistics in Table 1 show a high variation in external financing growth among firms in our sample, ranging from –165% to 169% for short-term financing and –137% to 136% for long-term financing. The median firm experienced a positive short-term financing growth, but a decline in long-term financing growth. Overall financing growth was negative, on average, with the effect being stronger for the smallest and youngest firms.

We combine the firm-level data with country panel data on the use of different macroprudential tools from the Global Macroprudential Policy Instruments (GMPI) survey as described above. Following Cerutti et al (2015), we aggregate the information on the specific instruments into two indicators covering two broad areas of macroprudential policy: tools targeted at borrowers' leverage and financial positions (BOR) and tools targeted at financial institutions (FIN).[7]

We control for several country-level time-variant factors to ensure that we do not confound the effect of macroprudential tools with other policies or macro factors. We control for the log change of GDP, thus effectively controlling for economic growth, and the real monetary policy rate, defined as the discount rate minus the inflation rate. Finally, we control for the effect of the Global Financial Crisis by including a dummy for the years 2008 and 2009.

The descriptive statistics in Table 1 show a high variation in the use of macroprudential tools across countries and over the sample period, ranging from zero to two instruments targeted at borrowers (out of two possible tools) and zero to six tools targeted at financial institutions (out of a possible maximum of 10 possible tools). The use is more widespread in emerging markets than in advanced countries.

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[6]   Some of these countries end up with fewer than 25 firms in our regressions, as not all firms have observations for the three dependent variables.

[7]   As the use of different macroprudential tools varies quite significantly across countries, we prefer to use aggregate indicators.

Descriptive statistics

Table 1

	Mean	Median	Standard deviation	Minimum	Maximum	Observations
Panel A: Firm variables						
Short-term financing growth	0.0319	0.0258	0.5354	−1.6546	1.6877	3,143,321
Long-term financing growth	−0.0656	−0.0773	0.4399	−1.3659	1.3607	3,143,321
Overall financing growth	−0.0155	−0.0335	0.2960	−0.7135	0.8944	3,143,321
Log (Total assets)	14.3372	14.2395	1.6434	11.4746	17.3467	3,143,321
Panel B: Firms with fewer than 10 employees						
Short-term financing growth	0.0127	0.0117	0.5434	−1.6546	1.6877	1,328,198
Long-term financing growth	−0.0807	−0.0921	0.4406	−1.3658	1.3607	1,328,198
Overall financing growth	−0.0380	−0.0595	0.2985	−0.7135	0.8944	1,328,198
Log (Total assets)	13.3390	13.2398	1.2072	11.4746	17.3467	1,328,198
Panel C: Firms with employees between 10 and 50						
Short-term financing growth	0.0485	0.0374	0.5320	−1.6546	1.6877	971,782
Long-term financing growth	−0.0427	−0.0620	0.4417	−1.3659	1.3607	971,782
Overall financing growth	0.0108	−0.0058	0.2935	−0.7135	0.8944	971,782
Log (Total assets)	14.9490	14.9641	1.1396	11.4746	17.3467	971,782
Panel D: Firms with employees 50 and 250						
Short-term financing growth	0.0557	0.0443	0.5136	−1.6546	1.6877	398,302
Long-term financing growth	−0.0324	−0.0517	0.4366	−1.3658	1.3607	398,302
Overall financing growth	0.0219	0.0056	0.2863	−0.7135	0.8944	398,302
Log (Total assets)	16.2771	16.4036	0.9445	11.4746	17.3467	398,302
Panel E: Firms with three or fewer years since incorporation						
Short-term financing growth	0.0333	0.0131	0.5351	−1.6546	1.6877	224,245
Long-term financing growth	−0.0624	−0.0740	0.4214	−1.3655	1.3607	224,245
Overall financing growth	−0.0435	−0.0804	0.2962	−0.7135	0.8944	224,245
Log (Total assets)	13.1035	12.8177	1.4273	11.4746	17.3467	224,245
Panel F: Country variables						
GDP growth	3.5350	3.7689	4.0179	−14.8142	15.2404	411
Real policy rate	0.2087	0.3433	4.6918	−16.9571	25.6001	411
MPI	1.7348	1	1.7711	0	8	411
BOR	0.3723	0	0.6553	0	2	411
FIN	1.3625	1	1.4081	0	6	411
Panel G: Advanced countries						
GDP growth	2.2782	2.6807	3.7712	−14.7244	11.9022	206
Real policy rate	0.2097	0.0433	2.9654	−14.1279	13.6856	206
MPI	1.1408	1	1.1580	0	5	206
BOR	0.2379	0	0.5289	0	2	206
FIN	0.9029	1	1.0266	0	3	206
Panel H: Emerging markets						
GDP growth	4.8177	5.1500	3.8247	−14.8142	14.1950	189
Real policy rate	0.1328	0.7542	6.1398	−16.9571	25.6001	189
MPI	2.4444	2	2.0868	0	8	189
BOR	0.5079	0	0.7553	0	2	189
FIN	1.9365	2	1.5899	0	6	189

3.2. Methodology

To assess the relationship between changes in macroprudential policies and growth in firms' loans, long-term debt and overall external financing, we run the following regression:

$$y_{ijt} = \alpha_1 + \beta_1 \text{Macro-pru}_{jt-1} + \beta_2 \text{Firm Size}_{it} + \beta_3 \text{Macro}_{jt-1} + \beta_4 \text{GFC}_t + \eta_i + \varepsilon_{ijt}, \quad (1)$$

where i denotes firm, j country and t year. The dependent variable is one of the following three variables: *log change in short-term debt*, *log change in long-term debt* and *log change in total financing* (defined as the sum of short- and long-term debt). *Macro-pru* is an indicator of macroprudential policies; *Firm Size* is proxied by the log of total assets; *Macro* is a vector of macroeconomic variables including the real monetary policy rate and the log change of GDP. *GFC* is the Global Financial Crisis dummy variable for 2008 and 2009 to control for the generally lower growth during this period.

We lag the macroprudential and macroeconomic variables to reduce any bias that might come from reverse causation and allow for the time lag it takes for policy to affect firms' financing growth. η_i is a vector of firm-fixed effects, to allow us to assess the effect of macroprudential policies on firms' financing growth controlling for any time-invariant firm characteristics. We weight observations by the inverse of the number of firms per country and year so that each country has the same weight in our estimations. Finally, we cluster standard errors at the country-level, thus allowing error terms to be correlated across firms within a country.

To investigate whether the impact of macroprudential policies varies with firm size and age, we run the above regression also for several subsamples of firms. Specifically, we run regressions for a sample of firms of one to nine employees, 10 to 49 employees and 50 to 249 or fewer employees,[8] as well as for a sample of firms that are three years or younger (since incorporation).[9] As they are more bank-dependent, we expect the effect of macroprudential policies to be stronger for smaller firms. We would therefore expect any impact of macroprudential policies to be stronger for smaller and younger firms.

3.3 Results

The results in Table 2 show a significant and negative relationship between macroprudential instruments and small firms' financing growth, while we find a less significant result for larger firms. The results in Panel A show a negative and significant (at the 10% level) relationship between firms' overall debt growth and changes in the overall index of macroprudential policies (MPI). A closer look at the components of MPI shows that this is driven mainly by the changes in borrower-related macroprudential policies (BOR). We find no significant relationship between short-term and long-term debt growth and changes in macroprudential policies.

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[8]   The employee ranges we consider coincide with the European Commission definition of micro (less than 10), small (from 10 to 49), and medium (from 50 to 249) firms.

[9]   We only include firms until three years after their incorporation. We classify firms according to the median employees across all observations available during the sample period.

Firms' financing growth and macroprudential policies

Table 2

Panel A: Overall sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.005**	0.005*	0.005**	0.007***	0.007***	0.008***	0.007***	0.007***	0.007***
	(2.15)	(1.95)	(2.23)	(3.71)	(3.73)	(3.81)	(3.43)	(3.45)	(3.57)
Log (Total assets)	−0.001	−0.001	−0.001	0.011***	0.011***	0.012***	0.004***	0.004***	0.004***
	(−0.77)	(−0.79)	(−0.75)	(4.92)	(4.92)	(4.93)	(2.86)	(2.86)	(2.89)
Real policy rate	−0.003	−0.003	−0.002	0.001	0.001	0.001	−0.001	−0.001	−0.001
	(−1.41)	(−1.42)	(−1.29)	(0.40)	(0.42)	(0.50)	(−0.62)	(−0.56)	(−0.47)
GFC	−0.052***	−0.052***	−0.053***	−0.050***	−0.051***	−0.051***	−0.057***	−0.058***	−0.058***
	(−4.52)	(−4.09)	(−4.71)	(−4.63)	(−4.67)	(−4.66)	(−6.79)	(−6.93)	(−6.83)
MPI	−0.005			−0.011			−0.016*		
	(−0.28)			(−0.87)			(−1.88)		
BOR		−0.028			−0.023			−0.031*	
		(−1.15)			(−1.09)			(−1.84)	
FIN			0.007			−0.008			−0.013
			(0.23)			(−0.47)			(−1.05)
N	3658784	3658784	3658784	3658784	3658784	3658784	3658784	3658784	3658784
Adj. R-squared	0.014	0.014	0.014	0.024	0.024	0.024	0.035	0.035	0.035

Panel B: Firms with one to nine employees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.007**	0.007**	0.007**	0.003	0.003	0.003	0.006**	0.006***	0.006***
	(2.34)	(2.35)	(2.32)	(0.91)	(0.94)	(0.95)	(2.69)	(2.72)	(2.71)
Log (Total assets)	−0.100***	−0.107***	−0.103***	−0.073***	−0.076***	−0.076***	−0.109***	−0.111***	−0.111***
	(−3.03)	(−3.05)	(−3.10)	(−3.00)	(−3.14)	(−3.08)	(−5.89)	(−5.78)	(−5.99)
Real policy rate	0.006	0.007	0.006	−0.010	−0.009	−0.009	−0.002	−0.001	−0.002
	(0.84)	(0.97)	(0.86)	(−1.66)	(−1.63)	(−1.63)	(−0.75)	(−0.52)	(−0.69)
GFC	−0.053	−0.057	−0.049	−0.079***	−0.083***	−0.077***	−0.058***	−0.062***	−0.057**
	(−1.32)	(−1.48)	(−1.19)	(−2.91)	(−3.02)	(−2.89)	(−2.70)	(−2.93)	(−2.58)
MPI	−0.097***			−0.069**			−0.060***		
	(−3.60)			(−2.34)			(−2.89)		
BOR		−0.073**			−0.101***			−0.081***	
		(−2.40)			(−5.03)			(−3.37)	
FIN			−0.123***			−0.067			−0.061*
			(−3.88)			(−1.53)			(−1.97)
N	1328198	1328198	1328198	1328198	1328198	1328198	1328198	1328198	1328198
Adj. R-squared	0.022	0.018	0.023	0.142	0.140	0.140	0.168	0.164	0.166

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies (continued) Table 2

Panel C: Firms with three or fewer years since incorporation

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.014***	0.014***	0.014***	0.002	0.001	0.001	0.007***	0.007***	0.007***
	(3.13)	(3.20)	(3.06)	(0.59)	(0.51)	(0.54)	(3.51)	(3.61)	(3.42)
Log (Total assets)	–0.388***	–0.383***	–0.389***	–0.228***	–0.230***	–0.232***	–0.281***	–0.281***	–0.281***
	(–6.94)	(–6.83)	(–6.95)	(–7.36)	(–7.64)	(–7.46)	(–9.18)	(–9.21)	(–9.00)
Real policy rate	–0.001	–0.001	–0.001	–0.004	–0.003	–0.003	–0.003	–0.003	–0.003
	(–0.21)	(–0.24)	(–0.21)	(–0.69)	(–0.68)	(–0.65)	(–0.79)	(–0.78)	(–0.79)
GFC	–0.052	–0.053	–0.052	–0.035	–0.034	–0.034	–0.042	–0.041	–0.041
	(–1.18)	(–1.20)	(–1.18)	(–1.21)	(–1.19)	(–1.18)	(–1.63)	(–1.64)	(–1.63)
MPI	0.016			–0.045			–0.007		
	(0.33)			(–1.47)			(–0.21)		
BOR		–0.027			–0.044			–0.009	
		(–0.56)			(–0.86)			(–0.23)	
FIN			0.059			–0.056			–0.006
			(0.63)			(–1.23)			(–0.11)
N	224245	224245	224245	224245	224245	224245	224245	224245	224245
Adj. R-squared	0.031	0.031	0.032	0.211	0.210	0.211	0.256	0.256	0.256

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

In Panel B, we limit our sample to firms with a median number of employees of nine or fewer over the sample period and find stronger results. There is a negative and significant relationship between changes in all three macroprudential indices' and small firms' short-term, long-term and total debt growth, with the notable exception of FIN in the regression of long-term funding growth. Specifically, macroprudential tightening by applying one additional instrument that is borrower-related (loan-to-value or debt service-to-income ratio) results in 7.3 percentage points lower short-term external debt growth, while one additional instrument that is bank-related results in 12.3 percentage points lower short-term external debt growth. The relationship between changes in macroprudential instruments and firms' long-term financing growth also enters negatively and significantly, although in this case it is driven by macroprudential tools aimed at borrowers; the coefficient on macroprudential tools aimed at banks enters negatively but insignificantly. We also find a negative and significant relationship between changes in macroprudential tools and firms' overall financing growth, in this case driven by both borrower-targeted and bank-targeted tools, although the latter enters significantly only at the 10% level. In unreported regressions, we find that, in the case of the sample of firms with 10 to 49 employees, there is only a negative and significant relationship between firms' long-term financing growth and changes in borrower-related macroprudential tools. None of the other coefficients enters significantly. When we consider the sample of firms with 50 to 249 employees, none of the macroprudential policies enters significantly. Finally, the results in Panel C do not show any significant relationship between firms' short-term, long-term or overall financing growth and macroprudential policies for a set of firms that are three years or younger

Turning to the control variables, we find a positive relationship between economic growth and firms' financing growth and a negative relationship with firm size as measured by the log of total assets. Financing growth during the GFC is significantly lower. The real policy rate enters negatively and significantly in the regressions of long-term and overall financing growth in Panel A, but not in the case of short-term financing growth. This variable is not significant in any of the regressions across the different subsamples.

In summary, we find strong evidence that firms' financing growth changes with changes in macroprudential policies, especially for smaller firms with fewer options for outside financing. There is somewhat stronger evidence that borrower-related macroprudential tools are more effective, most likely because they are harder to circumvent and also because smaller firms are often able to borrow against the owners' personal collateral. The ability to borrow for individuals is likely to be affected by loan-to-value and leverage ratios.

The results in Tables 3 and 4 consider two subsamples: advanced countries and emerging markets. One can consider several reasons why the relationship between firms' financing growth and macroprudential tools might vary across these two country groups. On the one hand, financial systems in most advanced countries offer more non-bank financing options so that we would expect a less strong and significant impact of macroprudential tools on firms in these countries. On the other hand, not only might it be harder to enforce prudential policies in emerging markets, but as these tools have been used for a longer time, firms might have found alternative financing sources over the years to counter the effect of macroprudential policies.

Firms' financing growth and macroprudential policies in advanced economies   Table 3

Panel A: Overall sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.006***	0.006***	0.006***	0.008***	0.008***	0.008***	0.007***	0.007***	0.007***
	(3.48)	(3.42)	(3.47)	(7.12)	(7.07)	(7.16)	(5.94)	(5.90)	(5.96)
Log (Total assets)	–0.133***	–0.132***	–0.133***	–0.125***	–0.125***	–0.128***	–0.139***	–0.139***	–0.140***
	(–7.75)	(–8.06)	(–7.83)	(–10.02)	(–9.90)	(–10.11)	(–9.46)	(–9.54)	(–9.58)
Real policy rate	–0.005***	–0.005***	–0.005***	–0.005*	–0.005*	–0.005**	–0.004**	–0.004**	–0.004**
	(–3.56)	(–3.50)	(–3.65)	(–2.03)	(–1.95)	(–2.08)	(–2.38)	(–2.32)	(–2.43)
GFC	–0.039***	–0.039***	–0.039***	–0.034***	–0.035***	–0.034***	–0.037***	–0.038***	–0.037***
	(–3.64)	(–3.57)	(–3.75)	(–2.89)	(–2.94)	(–2.91)	(–3.46)	(–3.48)	(–3.47)
MPI	0.002			–0.016			–0.007		
	(0.15)			(–0.86)			(–0.63)		
BOR		–0.004			–0.029			–0.011	
		(–0.22)			(–1.52)			(–0.74)	
FIN			0.006			–0.007			–0.006
			(0.38)			(–0.29)			(–0.32)
N	2922400	2922400	2922400	2922400	2922400	2922400	2922400	2922400	2922400
Adj. R-squared	–0.023	–0.023	–0.023	0.093	0.093	0.093	0.105	0.105	0.105

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies in advanced economies
(continued) Table 3

Panel B: Firms with one to nine employees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.006**	0.007**	0.007**	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(2.23)	(2.38)	(2.29)	(4.08)	(4.27)	(4.11)	(4.76)	(5.14)	(4.66)
Log (Total assets)	–0.092***	–0.102***	–0.096***	–0.097***	–0.098***	–0.100***	–0.119***	–0.121***	–0.122***
	(–3.09)	(–2.99)	(–3.18)	(–3.82)	(–3.80)	(–3.84)	(–6.49)	(–6.27)	(–6.68)
Real policy rate	–0.006	–0.005	–0.005	–0.006*	–0.006*	–0.006*	–0.005*	–0.005*	–0.004*
	(–1.56)	(–1.29)	(–1.49)	(–1.90)	(–1.75)	(–1.99)	(–1.88)	(–1.74)	(–1.90)
GFC	–0.056***	–0.063***	–0.052***	–0.034**	–0.038**	–0.034**	–0.043***	–0.046***	–0.042***
	(–3.14)	(–4.41)	(–2.85)	(–2.24)	(–2.37)	(–2.22)	(–3.42)	(–3.53)	(–3.35)
MPI	–0.106***			–0.043**			–0.041***		
	(–4.20)			(–2.23)			(–2.91)		
BOR		–0.050***			–0.088***			–0.067**	
		(–3.07)			(–3.04)			(–2.14)	
FIN			–0.130***			–0.029*			–0.034***
			(–7.35)			(–1.88)			(–2.94)
N	1293633	1293633	1293633	1293633	1293633	1293633	1293633	1293633	1293633
Adj. R-square	–0.017	–0.023	–0.017	0.115	0.115	0.113	0.132	0.131	0.130

Panel C: Firms with three or fewer years since incorporation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.008**	0.008**	0.008**	0.002	0.002	0.002	0.004**	0.004**	0.004**
	(2.21)	(2.19)	(2.20)	(1.04)	(1.02)	(0.99)	(2.39)	(2.37)	(2.36)
Log (Total assets)	–0.297***	–0.296***	–0.297***	–0.239***	–0.240***	–0.240***	–0.265***	–0.265***	–0.264***
	(–5.09)	(–5.03)	(–5.22)	(–7.56)	(–7.75)	(–7.07)	(–8.37)	(–8.41)	(–7.92)
Real policy rate	–0.001	–0.002	–0.001	–0.007**	–0.007**	–0.007**	–0.006	–0.006	–0.006
	(–0.19)	(–0.20)	(–0.21)	(–2.27)	(–2.11)	(–2.36)	(–1.52)	(–1.42)	(–1.70)
GFC	–0.057	–0.057	–0.057	–0.035	–0.034	–0.034	–0.042**	–0.042**	–0.042**
	(–1.50)	(–1.51)	(–1.51)	(–1.37)	(–1.35)	(–1.35)	(–2.67)	(–2.68)	(–2.70)
MPI	–0.000			–0.015			0.010		
	(–0.01)			(–0.38)			(0.28)		
BOR		–0.007			–0.007			0.008	
		(–0.12)			(–0.10)			(0.14)	
FIN			0.008			–0.023			0.011
			(0.21)			(–0.67)			(0.27)
N	215270	215270	215270	215270	215270	215270	215270	215270	215270
Adj. R-squared	–0.006	–0.006	–0.006	0.227	0.227	0.227	0.265	0.265	0.265

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies in emerging markets

Table 4

Panel A: Overall sample

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.008**	0.008**	0.008**	0.006**	0.007**	0.007**	0.006**	0.006**	0.006**
	(2.12)	(2.09)	(2.13)	(2.25)	(2.26)	(2.35)	(2.15)	(2.14)	(2.22)
Log (Total assets)	−0.090*	−0.086	−0.094*	−0.152***	−0.155***	−0.156***	−0.149***	−0.150***	−0.151***
	(−1.87)	(−1.57)	(−2.02)	(−8.42)	(−8.48)	(−8.63)	(−8.30)	(−8.86)	(−8.16)
Real policy rate	0.000	−0.000	0.000	0.002	0.002	0.002	0.001	0.001	0.001
	(0.04)	(−0.06)	(0.11)	(0.94)	(1.06)	(1.08)	(0.53)	(0.58)	(0.63)
GFC	−0.058***	−0.058***	−0.059***	−0.037**	−0.037**	−0.037**	−0.053***	−0.053***	−0.053***
	(−3.34)	(−3.38)	(−3.34)	(−2.16)	(−2.19)	(−2.14)	(−4.61)	(−4.71)	(−4.55)
MPI	0.002			−0.034**			−0.020		
	(0.08)			(−2.28)			(−1.54)		
BOR		−0.046			−0.073***			−0.045**	
		(−1.46)			(−6.22)			(−2.13)	
FIN			0.023			−0.031			−0.016
			(0.41)			(−1.32)			(−0.85)
N	220484	220484	220484	220484	220484	220484	220484	220484	220484
Adj. R-squared	0.025	0.026	0.026	0.143	0.143	0.142	0.161	0.162	0.161

Panel B: Firms with one to nine employees

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.011	0.011	0.011	−0.005	−0.004	−0.005	0.005	0.005	0.005
	(1.66)	(1.63)	(1.65)	(−0.56)	(−0.56)	(−0.58)	(0.86)	(0.86)	(0.84)
Log (Total assets)	−0.118	−0.122	−0.120	−0.061	−0.069	−0.062	−0.108**	−0.114**	−0.109**
	(−1.41)	(−1.43)	(−1.44)	(−1.10)	(−1.22)	(−1.10)	(−2.46)	(−2.50)	(−2.46)
Real policy rate	0.023	0.024	0.023	−0.019	−0.017	−0.020	0.000	0.002	−0.000
	(1.64)	(1.70)	(1.65)	(−1.41)	(−1.40)	(−1.39)	(0.01)	(0.42)	(−0.09)
GFC	−0.052	−0.055	−0.049	−0.192**	−0.193**	−0.187**	−0.100	−0.102	−0.097
	(−0.40)	(−0.42)	(−0.38)	(−2.39)	(−2.41)	(−2.32)	(−1.48)	(−1.53)	(−1.39)
MPI	−0.074			−0.116*			−0.090**		
	(−1.54)			(−1.91)			(−2.19)		
BOR		−0.117*			−0.117***			−0.105***	
		(−1.97)			(−4.66)			(−3.15)	
FIN			−0.083			−0.165			−0.121*
			(−0.98)			(−1.64)			(−1.79)
N	34542	34542	34542	34542	34542	34542	34542	34542	34542
Adj. R-squared	0.106	0.105	0.105	0.180	0.172	0.181	0.213	0.203	0.212

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies in emerging markets (continued)

Table 4

Panel C: Firms with three or fewer years since incorporation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.018*	0.019**	0.017*	0.004	0.003	0.003	0.011**	0.011***	0.011**
	(2.03)	(2.32)	(1.90)	(0.54)	(0.49)	(0.45)	(2.74)	(2.93)	(2.61)
Log (Total assets)	−0.552***	−0.543***	−0.560***	−0.213***	−0.218***	−0.217***	−0.302***	−0.303***	−0.305***
	(−4.84)	(−4.65)	(−4.93)	(−3.29)	(−3.38)	(−3.33)	(−4.81)	(−4.74)	(−4.88)
Real policy rate	0.003	0.004	0.003	−0.001	−0.001	−0.002	0.003	0.003	0.002
	(0.37)	(0.46)	(0.38)	(−0.17)	(−0.14)	(−0.22)	(0.52)	(0.55)	(0.49)
GFC	−0.032	−0.037	−0.028	−0.046	−0.044	−0.044	−0.042	−0.042	−0.041
	(−0.32)	(−0.37)	(−0.28)	(−0.66)	(−0.65)	(−0.62)	(−0.64)	(−0.64)	(−0.61)
MPI	0.025			−0.082			−0.032		
	(0.27)			(−1.67)			(−0.60)		
BOR		−0.098***			−0.123			−0.066**	
		(−3.35)			(−1.70)			(−2.29)	
FIN			0.124			−0.093			−0.023
			(0.71)			(−1.17)			(−0.22)
N	8971	8971	8971	8971	8971	8971	8971	8971	8971
Adj. R-squared	0.087	0.088	0.089	0.158	0.157	0.157	0.234	0.234	0.233

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

The results in Table 3 show no significant relationship between firms' short-term, long-term and overall financing growth and macroprudential tools in the overall sample of firms in advanced countries (Panel A), while we again find strong evidence that different types of macroprudential policy affect short-term, long-term and overall financing growth in the case of smaller firms with fewer than 10 employees in advanced economies (Panel B). In unreported regressions, we also find some evidence that borrower-related macroprudential policies affect the long-term financing growth of firms with 10 to 49 employees, while there is no evidence of a significant impact of macroprudential policies in the sample of firms with 50 to 249 employees in advanced countries. Similarly, we do not find any evidence of an effect of macroprudential policies on financing growth of firms with three or fewer years since incorporation in advanced countries (Panel C). Turning to the control variables, we find similar results as in Table 3, with the exception of the real monetary policy rate, which enters negatively and significantly across all regressions in Panel A and across several subsample regressions.

The results in Table 4 for the sample of firms in emerging markets show a somewhat stronger impact of macroprudential policies in these countries. First, we find some evidence of an effect of borrower-related macroprudential policies on firms' long-term and overall financing growth (Panel A), although there is no significant relationship with the short-term financing growth of firms in emerging markets. We find rather strong evidence that borrower-related macroprudential tools

have an impact on small firms' long-term and overall financing growth (Panel B), and significant (at the 10% level) evidence of a negative relationship between macroprudential tools and small firms' short-term financing growth in emerging markets. In unreported regressions, we also find a negative relationship between borrower-targeted macroprudential policies and long-term funding growth for the sample of firms with 10 to 49 employees and no evidence for a significant relationship between macroprudential tools and firms' financing growth in emerging markets in a sample of firms with 50 to 249 employees. Finally, we find some evidence that young firms' short-term and overall financing growth is affected by changes in borrower-related macroprudential tools (Panel C). The fact that we find some negative effects for young firms in emerging markets, while we do not find any evidence for any such effect on young firms in advanced economies, could be due to the fact that angel or venture capital financing is more likely to be available for firms in advanced countries than it is in emerging markets. Turning to the control variables, we again find a negative and significant relationship of financing growth with firm size and a more tenuous positive relationship between GDP growth and financing growth. The real monetary policy rate rarely enters significantly and we have a less strong relationship between financing growth and the GFC than in the sample of advanced countries.

In summary, we confirm many of our main findings in the subsamples of advanced countries and emerging markets, but also find some critical differences. First, in advanced countries, it is mostly the smaller firms that are affected by macroprudential policies, while in emerging markets it is both small and young firms that are affected. Second, in emerging markets, it is mainly borrower-related macroprudential tools that seem to work, while in advanced countries it is both borrower- and bank-related macroprudential tools that work.

4. Conclusion

This paper shows that there has been financial deepening and credit growth across countries of all income levels in Asia. We also assess the effect of macroprudential policies on firms' funding growth across a broad cross-section of firms and countries, differentiating between firms of different sizes and ages, emerging markets and advanced countries, and different types of macroprudential policy. We find evidence that the smallest firms (those with fewer than 10 employees) are more likely to be affected by macroprudential policies. We find some evidence that younger firms are more affected in emerging markets. We also find that borrower-targeted policies are more effective than policies targeted at financial institutions. Overall, these findings are consistent with the broader literature on financing constraints, which shows that smaller firms are more affected by financing constraints and by monetary policy measures. The findings that borrower-targeted policies are more effective than measures targeted at banks are consistent with previous findings that macroprudential measures targeted at banks are subject to leakage (Aiyar et al (2014)).

The efficiency of borrower-targeted policy measures raises additional questions. In many cases, such restrictions apply only to residential real estate lending, which is consistent with the fact that only the smallest firms are significantly affected by such restrictions, as in these cases owners might collateralise funding with their personal real estate. This might also explain why younger firms in emerging markets are

affected by borrower-targeted policies, while younger firms in advanced countries are not affected by any of the macroprudential policies, most likely relying on non-bank funding.

Returning to the theme we started with, our findings point to a clear trade-off between financial stability and financial deepening. As in the case of capital account restrictions (Forbes (2007)), smaller firms are the ones most affected by macroprudential tools, which points to a trade-off in the implementation of these policies.

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Appendix

Country and firm coverage			Appendix Table A1
Country	Number of firms	Country	Number of firms
Argentina	451	Latvia	10028
Australia	612	Lithuania	1606
Belgium	63560	Malaysia	1273
Brazil	88	Malta	842
Bulgaria	6760	Mexico	165
Canada	606	Montenegro	110
Chile	105	Netherlands	126
China	694	New Zealand	33
Colombia	1012	Norway	12115
Croatia	15387	Pakistan	275
Cyprus	260	Peru	75
Czech Republic	11681	Philippines	262
Ecuador	61	Poland	15333
Estonia	13392	Portugal	44544
Finland	29158	Romania	914
France	355851	Russia	30986
Germany	38123	Singapore	229
Hungary	6035	Slovakia	2479
Iceland	2967	Slovenia	12097
India	377	South Africa	159
Indonesia	219	Spain	182826
Ireland	5078	Sweden	44816
Israel	291	Switzerland	115
Italy	188487	Thailand	10992
Japan	142120	Turkey	3153
Jordan	62	United Kingdom	54645
Kazakhstan	158	United States	12165
Korea	40966	**Total**	**1366924**

Comments on "Credit growth and macroprudential policies: preliminary evidence on the firm level"

Jae-Ha Park[1]

Summary

This paper deals with important policy issues relating to macroprudential policies (MPPs), such as how to assess the effectiveness of different MPPs on firms' short-term vs long-term external financing, and also how to test heterogeneity of the relationships across different types of firm (eg small vs large, young vs old), country (emerging market vs advanced) and macroprudential instrument (eg borrower-targeted vs financial institution-targeted). For this purpose, the authors combine firm-level data for over 1.3 million firms for the period between 2000 and 2011 in 59 countries that have adopted 12 different MPPs, and conduct panel regression analyses.

The authors find that MPPs matter more for smaller firms with limited non-bank financing sources, that only borrower-targeted MPPs are negatively associated with growth of long-term debts, and that both borrower- and financial institutions-targeted MPPs are negatively associated with the growth of short-term and overall debt. On the heterogeneity of the empirical results, they find that mostly smaller firms are affected by MPPs in advanced countries, while in emerging market economies both small and young firms are affected. Also, they find that mainly borrower-targeted MPPs seem to work in emerging market economies, while both borrower- and bank-related MPPs seem to work in reducing credit growth in advanced countries. Finally, they find that MPPs targeting borrowers are more effective in emerging market economies.

The important main contribution of this paper is that this is the first paper that explores the impact of MPPs on specific firm-level credit growth, rather than typical macro-level impacts, such as GDP or total credit growth. Also, this paper uses a massive amount of firm-level data of both listed and unlisted private firms with different sizes and ages.

Comments on data

My comments start with the quality of the data used in this paper. The authors used data for over 1.3 million firms, including both listed and unlisted private firms with different sizes and ages in 59 countries. It is well known that data for small firms, particularly those for unlisted firms in emerging market economies, have serious reliability problems. Even in advanced countries, data for small and medium-sized enterprises (SMEs) as well as unlisted private firms have serious reliability problems.

Therefore, I suggest that the authors assess the costs and benefits of including data for a large number of small, unlisted firms.

In Table A1, the country and firm coverage of data used in this paper are specified. However, the authors do not provide information on which countries are advanced or emerging market, and how many firms in each country are small, medium or large. For our information, Cerutti et al (2015) covers 31 advanced countries, 64 emerging market economies and 24 low-income developing countries. I suggest checking the robustness of the empirical results depending on the group of countries and firms.

Finally, the number of surveyed firms for each country varies too much, as the authors also admit. Usually, small firms are more dominant in emerging market economies than they are in advanced countries. Even in advanced countries, the number of firms is quite unbalanced, such as 355, 851 firms in France, 12,165 firms in the United States, and only 115 firms in Switzerland. I wonder if the authors can fix this problem by using a more balanced number of firms for each country. In particular, how about using only listed firms by deleting private firms that may have significantly different characteristics across countries? If data for only listed firms were to be used in this paper, the authors could also use stock price data. In that case, I would suggest including Tobin's Q variable in the regression model to control investment opportunities on the assumption that firms may increase debt for investment purposes.

Comments on empirical specifications

On the empirical specifications, I have couple of comments. First, I suggest the authors consider including a new control variable, log debt$_{I,t-1}$, since highly indebted firms may have difficulty in receiving fresh loans because of a debt overhang. And, a hypothesis can be tested if highly indebted firms are more sensitive to MPPs.

Second, I suggest including a new control variable to test if firms with alternative financing sources are more weakly associated with MPPs. In that case, the authors could check if MPPs do not work for the firms that can easily finance themselves from alternative sources, such as capital markets or foreign financial institutions.

Third, related to the impact of the Great Financial Crisis in 2008, this paper simply includes a time dummy variable, GFC. However, a GFC variable can only capture the impact of financial crisis on firms' total debt growth. To test the impact of MPPs pre- and post-crisis, I suggest estimating regressions separately for the periods before and after the crisis.

Fourth, some recent financial researchers, such as Hadlock et al (2010), proposed measuring firms' financial constraints by size and age. I am curious if the findings of this paper can be linked to the outcome of those researches. More specifically, is it possible to interpret the results of this paper as "Are those firms with more serious financial constraints influenced by MPPs?"

Fifth, since country-specific effects are not considered in this paper, the error term (ε_{ijt}), might be serially correlated due to the individual country j's trend in adopting MPPs. To check the robustness of this correlation problem, applying the Generalised Method of Moments (GMM) may be considered.

Finally, to test possibility of co-movements among countries' implementation of MPPs, I suggest applying a panel co-integration estimation method.

Comments on the effects of macroprudential policies

When we review the macroprudential instruments actually used in advanced and emerging market economies, LTV limits are used relatively more in advanced countries, while debt-service-to-income limits are used more in emerging market economies. Also, the financial institution-targeted instruments, such as limits on the growth in domestic currency loans (CG) and reserve requirements (RR_REV), are mainly used in emerging market economies. As we see in the graphs below, the portion of financial institution-targeted MPPs in emerging market economies is greater than that of advanced countries, and furthermore emerging market economies are heavily dependent on limits on foreign currency loans.

The relative use of macroprudential policies over time by group   Graph 1
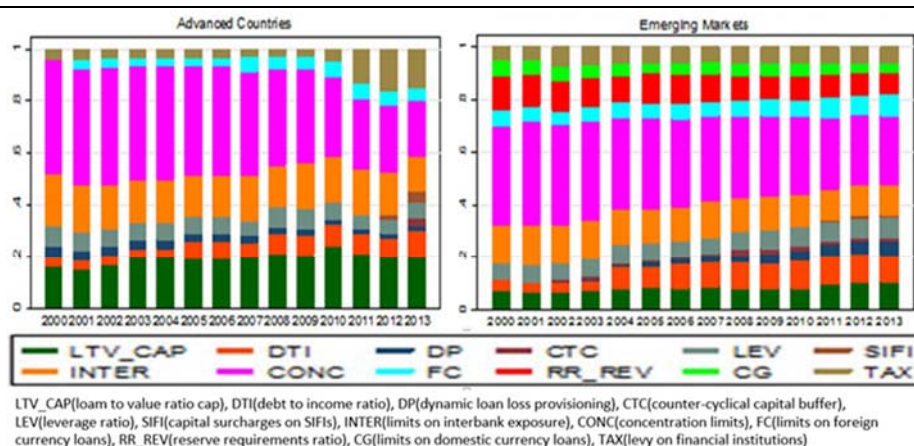
LTV_CAP(loam to value ratio cap), DTI(debt to income ratio), DP(dynamic loan loss provisioning), CTC(counter-cyclical capital buffer), LEV(leverage ratio), SIFI(capital surcharges on SIFIs), INTER(limits on interbank exposure), CONC(concentration limits), FC(limits on foreign currency loans), RR_REV(reserve requirements ratio), CG(limits on domestic currency loans), TAX(levy on financial institutions)

Source: Cerutti, Claessens and Laeven(2015), "The use of effectiveness of macroprudential policies," presented at CBRT/BIS/IMF conference, Istanbul, Turkey on 26-27 Oct. 2015

A question can be raised on the relationship between these facts and the empirical evidence found in this paper. More specifically, why are financial institutions-targeted MPPs more effective in advanced countries even though they do not use them as the main instruments, such as CG or RR_REV?

Another question can be raised on the inconsistency between the findings in the empirical results in Table 3 (pages 27 and 28). The main text (page 30, first paragraph) and the three panels in Table 3 show that borrower-related policies (BOR) have no significant relationship with short-term financing growth in the case of firms in advanced countries with 10 or more employees or firms with three or fewer years since incorporation, but have a significant relationship with short-term financing growth in the case of smaller firms with fewer than 10 employees.

My final comment is on the reasons why MPPs work better for small firms. The authors explain that it is because small firms are able to borrow against the owners' collateral. However, I think MPPs are more effective for small firms, particularly in emerging market economies, because they cannot easily circumvent MPPs but large

firms can easily borrow abroad or from another sources thanks to their relatively strong reputation. Cerutti et al (2015) also found that MPPs have weaker effects in more developed and more financially open economies.

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Household credit, growth and inequality in Malaysia: does the type of credit matter?[1]

Jiaming Soh, Amanda Chong and Kue-Peng Chuah[2]

Abstract

Do different types of household credit affect income growth and income inequality differently? This empirical paper investigates this question by employing both macro-level data and micro-level household survey data, covering the period since 1997. We find that the different types of household credit matter, and our contributions are twofold. First, on income growth, both macro- and micro-analyses consistently find housing credit to be positively associated with future income growth, while consumption credit shows no significant evidence. Second, on income inequality, the results are more nuanced. At the macro level, housing credit in terms of total net disbursements is positively related to income inequality. However, the micro-level data, which investigate the proportion of households with housing loans, find a negative relationship with income inequality. We interpret these two sets of empirical results for housing credit to imply that financial inclusion that improves access to housing credit for more households would likely reduce income inequality. Meanwhile, further accumulation of housing credit for existing borrowers may worsen income inequality given the likely concentration of housing wealth among richer households. The findings in our paper fill a research gap for the Malaysian economy and could serve to inform policies, especially in relation to the broader discussion of household indebtedness.

Keywords: Household credit, housing and consumption credit, income growth, income inequality

JEL classification: E44, E50, E51

1. Introduction

Since 1997, Malaysia's household debt as a percentage of GDP has doubled from 43% to 89%, and is currently among the highest in the Asia region. In terms of composition, there has been a gradual shift over the years away from consumption credit towards housing credit. To date, housing credit has taken up the largest proportion of total banking system household loans, and its share has persistently increased from 36% in 1997 to 51% in the first half of 2016. Given these developments, a meaningful assessment of the relationships between household credit and income growth and income inequality would necessitate differentiation between the types of credit. For instance, housing credit, in addition to its direct impact on real sector growth through housing-related consumption and investment, has an indirect influence through households' accumulation of assets. This added layer of influence would affect not only households' current balance sheet position, but their future flow of income and wealth depending on asset price movements. Consumption credit, such as personal and passenger vehicle loans, on the other hand, would facilitate households' current expenditure more directly, with less of the accompanying influence through asset accumulation.

In this paper, we therefore distinguish between housing and consumption credit and investigate their varying effects on future income growth and income inequality. We find that the type of household credit matters, and our contributions are twofold. First, on future income growth, both macro- and micro-analyses show consistent results to highlight the significance of housing credit:

- At the macro level, household credit net disbursements are positively associated with future GDP per capita growth, with housing credit accounting for most of the positive effects. In addition, we show that this positive impact of housing credit is likely driven by housing wealth. We note, however, that the positive effect of housing credit may not be linear and could diminish at higher levels of net disbursements.

- Similarly, at the micro level, a higher proportion of households with housing loans is positively associated with a higher increase in future household disposable income.

- In both cases, consumption credit has no significant impact on future income growth.

Second, on future income inequality, the results are more nuanced:

- From the macro-level study, housing credit in terms of total net disbursements is positively related to income inequality.

- However, the micro-level study, which investigates the proportion of households with housing loans, finds a negative relationship with income inequality.

- In both cases, consumption credit has no impact on income inequality.

On income inequality, we reconcile the two sets of findings for housing credit in Section 6. We interpret the findings to suggest that the distribution of housing credit matters for income inequality. Financial inclusion that improves access to housing credit for a larger proportion of households would likely reduce income inequality. In contrast, further accumulation of housing credit for existing borrowers may worsen income inequality given the likely concentration of housing wealth among richer

households. Taken together, the positive association that we find at the macro level between housing credit and income inequality would suggest that the net effect is driven by the latter. This interpretation is further supported by insights derived from the micro-level data in Section 6, which show the distribution of housing credit among Malaysian households across different income groups. In fact, we find that the disparity in housing credit across the different income groups is striking and that housing credit is mostly concentrated in the top 20% of the income distribution.

The rest of the paper is organised as follows. The literature review in Section 2 discusses how our paper fits into the empirical literature of finance and growth as well as finance and inequality. Section 3 provides a descriptive background of household debt in Malaysia between 1997 and the first half of 2016. Section 4 describes the data that we use for the macro- and micro-level analyses. Section 5 presents the regression estimations and results. Section 6 proposes a conceptual framework on the channels through which housing loans can affect income growth and income inequality. Section 7 concludes.

2. Literature review

In this section, we discuss how our paper fits into the broader empirical literature that relates finance to growth and income inequality.[3] We offer a general discussion on the literature, since to our knowledge there are currently no empirical paper on Malaysia that is directly comparable to the research carried out in this paper.

The positive effect of finance on economic growth is supported extensively in the empirical literature (Garcia-Escribano and Han (2015), Levine (2005), Levine et al (2000) and King and Levine (1993)). Most papers are cross-country studies, and finance is commonly measured as the stock of debt at the aggregate level.[4]

A smaller set of papers examines disaggregate data to estimate how different types of credit impact growth, particularly focusing on the distinction between corporate and household credit given that firms and households have strikingly different behaviour such that they impact growth differently in terms of size and channels. This, in turn, would inform policymakers in terms of promoting investment-led growth, consumption-led growth or both. Such papers tend to find that the composition of credit matters, with corporate credit having a larger impact in fostering growth through the productive channel (Angeles (2015), Garcia-Escribano and Han (2015) and Beck et al (2012)). For instance, Beck et al (2012) investigate a panel dataset of 45 advanced and developing countries, which includes Malaysia, and find that corporate debt has a positive impact on growth in real GDP per capita and helps to reduce income inequality, while household debt has no significant impact. More recently, Angeles (2015) uses a new BIS panel dataset to conclude that corporate debt is beneficial for growth, while the effects of household debt can be

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[3]   For the theoretical literature on finance, growth and inequality, see Demirgüç-Kunt and Levine (2009), Levine (2005) and Harrison et al (1999).

[4]   Our paper abstracts from the literature on the threshold effect of debt on growth, although some preliminary estimations on non-linear effects are carried out using a simple quadratic specification and discussed in Section 5.1.

detrimental as it can often lead to unproductive activities. However, most studies focus on cross-country comparisons with more attention on advanced countries.

Of note, even fewer papers focus on the different types of household debt, particularly differentiating between housing and consumption credit, which is where our paper makes a contribution. For Malaysia, we point out the significance of housing credit. Using a different approach, Garcia-Escribano and Han (2015) investigate a dynamic panel dataset of 31 emerging markets, which includes Malaysia, and find evidence that both housing and consumer credit contribute positively to GDP growth and private consumption. They also suggest that housing credit affects growth through the housing wealth channel, in line with the findings in the literature (Mian and Sufi (2016), Muellbauer (2008) and Campbell and Cocco (2005)). Meanwhile, for Malaysia, a paper by Murugasu et al (2015) finds varying impacts of housing wealth and consumption credit on private consumption growth.

In addition, examining the composition of household credit allows us to extend the research to cover income inequality and the progress of financial inclusion in Malaysia over the recent years. Compared to the finance and growth literature, there are a limited number of papers on finance and income inequality. Nonetheless, there are increasingly more papers that study the impact of debt on income inequality, and evidence tends to support its positive impact in reducing inequality (Demirgüç-Kunt and Levine (2009) and Beck et al (2007)). We contribute to this area by identifying the type of household credit that matters for income inequality in Malaysia.

3. Background on household debt in Malaysia

Over the past two decades, Malaysia's household debt, both in absolute terms and as a share of GDP, has generally been on a rising trend (Graph 1). Since 1997, the level of household debt has increased more than sevenfold, registering on average a double-digit growth of 11% per annum to reach RM1.1 trillion in the first half of 2016.

Correspondingly, household debt doubled from 43% of GDP in 1997 to 89% of GDP in the first half of 2016. With the persistent increase in lending to the household sector, household credit now accounts for more than 60% of total bank and non-bank lending, surpassing corporate credit since 2004.

Households' decision to accumulate debt can be ascribed to several factors. As highlighted in Endut and Toh (2009), the three key factors that underpin the increase in Malaysia's household debt are: 1) macroeconomic stability, with sustained economic growth contributing to rising household incomes; 2) financial sector development promoting financial inclusion; and 3) government policies promoting home ownership and the development of the housing market.

Household debt as a share of GDP, 1997-2016

As a percentage of GDP
Graph 1
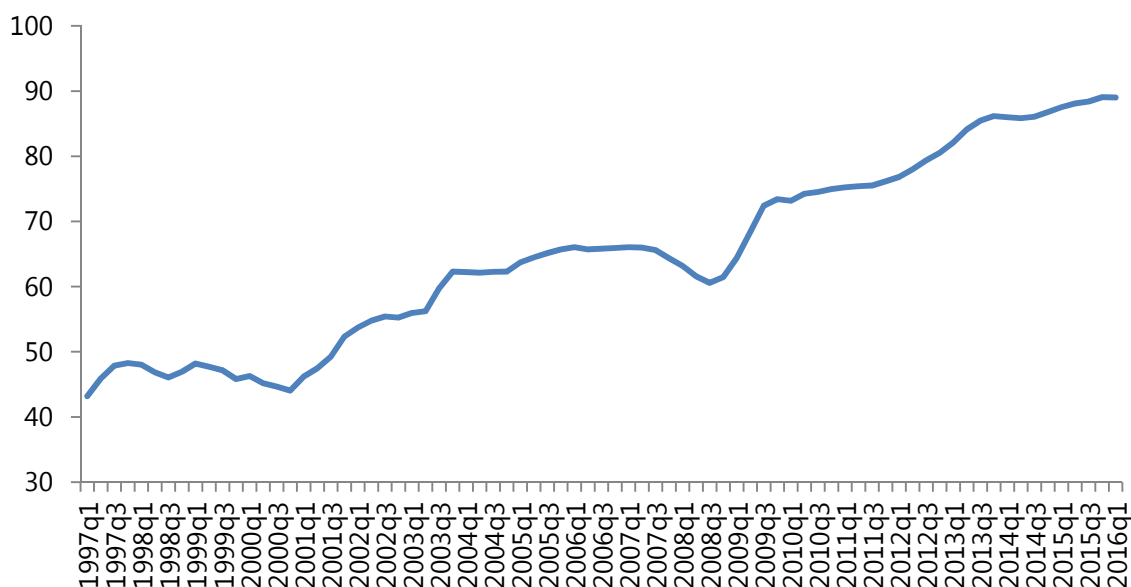
Sources: Bank Negara Malaysia; authors' estimates.

Beyond these factors, housing as a whole is crucial in understanding the accumulation of household debt. As experienced in other countries, rising household indebtedness in the past decade has often been tied to the developments in the housing market (Mian and Sufi (2016)). Similarly, the increase in household debt in Malaysia over this period stemmed mainly from housing credit.[5] The stock of housing credit as a share of GDP has consistently been higher than that for consumption credit, and has increased by about 20 percentage points from 1997 to the first half of 2016 (Graph 2). In level terms, housing credit expanded on average by 11% per annum to account for more than 50% of household debt in the first half of 2016. In contrast, consumption credit as a share of GDP only increased by 8 percentage points, and constituted about 35% of household debt in the first half of 2016.

The shift in lending towards housing is also evident from the flow perspective. Housing credit net disbursements[6] as a share of GDP have been higher, on average, than consumption credit net disbursements, and the gap between these two types of credit has in fact widened since 2010 (Graph 3).

[5]   A housing loan is a residential property loan given to households.

[6]   Net disbursements are the difference between total loans disbursed and total loans repaid.

Housing and consumption debt as a share of GDP, 1997-2016

As a percentage of GDP

Graph 2
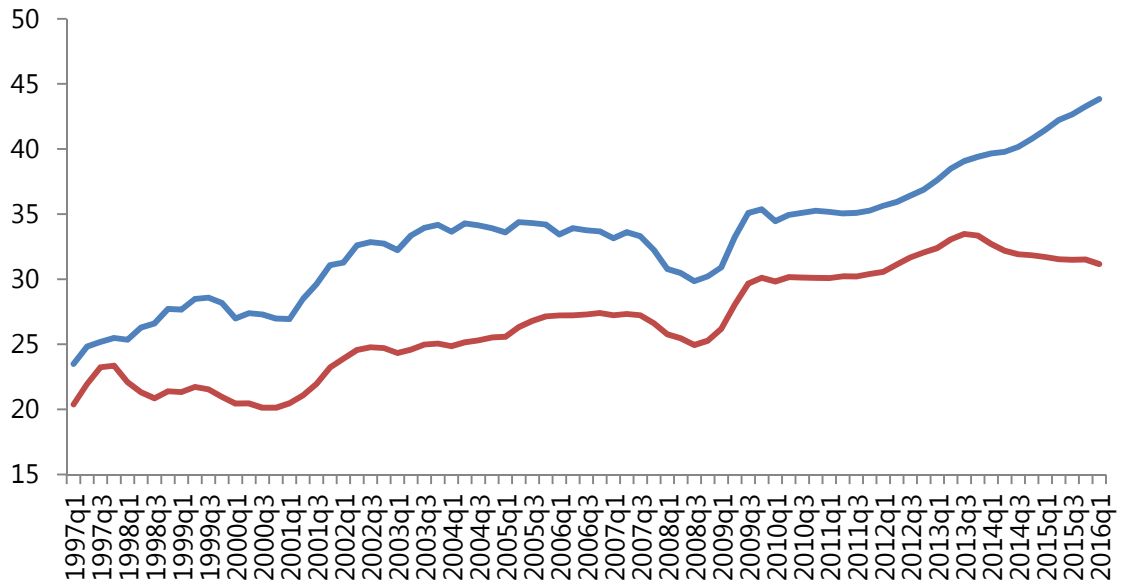
Sources: Bank Negara Malaysia; authors' estimates.

Housing and consumption net disbursements as a share of GDP, 1997–2016

As a percentage of GDP

Graph 3
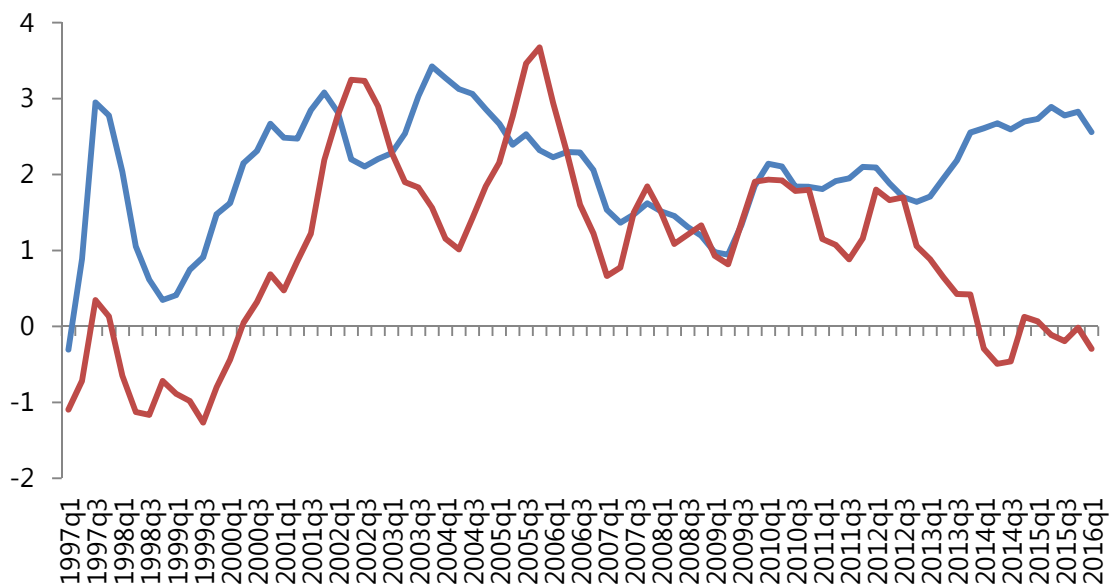
Sources: Bank Negara Malaysia; authors' estimates.

4. Description of data

This paper draws on both macro-level and micro-level datasets for Malaysia. For the macro-level analyses, the sample period spans from 1997Q1 to 2015Q2. Income growth in terms of GDP per capita is constructed using real GDP[7] and population data from the Department of Statistics Malaysia. Income inequality is defined to be the gap between mean and median real household income, as a share of median income. A positive income inequality gap (ie mean ≥ median) implies a greater concentration of income among the higher-income households (right-skewed distribution). Based on this definition, the level of income inequality has seen a notable decline since 1997 (Graph 4).[8]

Gap between mean and median income, 1997-2014

As a percentage of median income   Graph 4
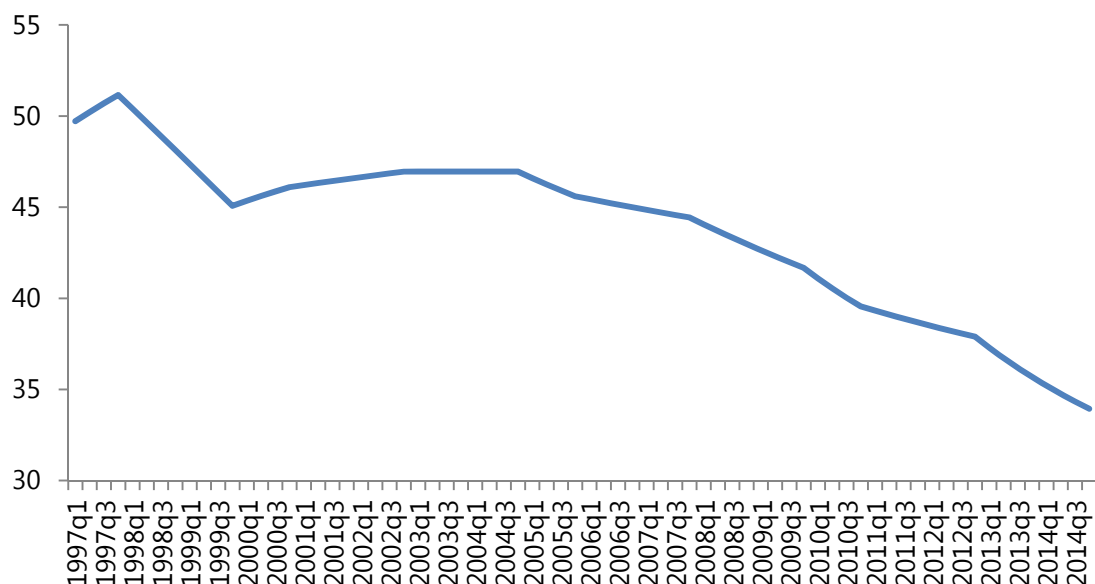
Sources: HIES 2009 and 2014, Department of Statistics; authors' estimates.

For the credit variables, we use net disbursements, which are a flow variable that captures the net effect of credit disbursed to and repaid by households during the quarter. The data include credit extended by the banking system and development financial institutions (DFIs), and are obtained internally from Bank Negara Malaysia. Housing credit refers to credit extended to households for the purchase of residential

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[7]   Real GDP is constructed by deflating nominal GDP data using the consumer price index (CPI) with 2010 as the base year.

[8]   Similarly, the Gini coefficient for Malaysia declined from 0.459 in 1997 to 0.401 in 2014 (source: Department of Statistics Malaysia). In this paper, we use the gap between mean and median income as a proxy for income inequality, instead of the conventional Gini coefficient, as it is more parsimonious when computing inequality with the micro-level dataset.

property. Consumption credit comprises personal, credit card, passenger vehicle and consumer durable loans. All credit variables are deflated by CPI with 2010 as the base year to obtain the real values.

To explore the channels through which housing credit may affect future GDP per capita growth, we also construct a housing wealth indicator for Malaysia based on Murugasu et al (2015). Specifically, housing wealth is constructed using Equation (1), by multiplying the total number of owner-occupied units in the economy with the average house price:

$$HW_t = ((HS_t - HU_t) * HP_t). \tag{1}$$

At time t, HW_t is the housing wealth, HS_t is the housing stock, HU_t is the total number of unsold units, and HP_t is the average house price. This indicator captures the amount of housing wealth for all owner-occupied units in the economy at a point in time.

The data for the control variables are obtained from the Department of Statistics Malaysia. The dependency ratio is defined as the total number of dependants as a proportion of the working age population. Openness to trade refers to the sum of exports and imports as a share of GDP, and saving rate refers to gross saving as a share of GDP. When estimating the regressions for income inequality, we proxy the effects of human capital accumulation on future inequality by using the total secondary enrolment ratio[9] as an additional control variable.[10]

For the micro-level analyses, the sample period covers 2009 and 2014. The micro-level dataset draws from the recently released 2014 Household Income and Expenditure Survey (HIES), and is constructed by combining data from the 2009 HIES dataset. Both surveys of households in Malaysia are carried out using a personal interview approach, covering urban and rural areas for all states in Malaysia. The surveys are carried out by probability sampling that represents all households in Malaysia, and contain detailed information on households' income, types of loans and number of loans.[11]

Of note, we merge the two HIES datasets using three common characteristics that are available in both surveys: state, education level, and age group for the head of household. We call this the combined HIES dataset. Specifically, the state refers to the 15 states in Malaysia;[12] the education level is split into four categories that cover no formal education, primary education, secondary education and tertiary education; and there are nine categories for age group, starting from 10–20 and ending at 90–100.

Once the households from both datasets are grouped according to the three common characteristics, we compute, for each respective group, the median and mean levels of disposable income. This allows us to construct two new dependent variables for each household group: *income growth* as the change in median

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[9]   The ratio refers to the total number of enrolled secondary students as a share of the official population for secondary-education age.

[10]   We carried out an augmented Dicker-Fuller test on the main macro variables to check for non-stationarity. The results are displayed in Table 10. Based on all the p-values, we reject the null hypothesis that the macro variables have a unit root.

[11]   The survey in 2009 covers 21,641 households, whereas the 2014 survey covers 49,862 households.

[12]   The states in Malaysia are Johor, Kedah, Melaka, Negeri Sembilan, Pahang, Pulau Pinang, Perak, Perlis, Selangor, Terengganu, Sabah, Sarawak, Kuala Lumpur, Labuan and Putrajaya.

household disposable income between 2009 and 2014, and the *change in income inequality* as the change in the mean and median disposable income gap between 2009 and 2014. As for the explanatory variable of interest, we construct the credit variable as the percentage of households in each group with at least one loan facility.

5. Estimations and results

5.1. Household credit and future income growth

5.1.1. Macro-level income growth analysis

In this section, we explore the macro-level relationship between household credit and future GDP per capita growth. Our empirical strategy follows closely the growth equations in Cecchetti et al (2011), which are derived from the neoclassical Solow growth model. In this specification, the rate of convergence of GDP per capita growth depends on the initial level of GDP per capita and other commonly used determinants, including the saving ratio, dependency ratio and openness to trade. Building upon this standard model, we then augment this specification with various types of household credit to capture the impact of credit on future GDP per capita growth. We further disaggregate household credit into housing and consumption credit to distinguish their respective effects on growth.

To minimise the reverse causality from growth to credit, we define future income growth as the average of four-quarter ahead GDP per capita growth. In all the growth regressions, we include the vector of regressors X to control for potential endogeneity of our estimates, with X containing the following variables: the saving-to-GDP ratio, the dependency ratio, openness to trade, log GDP per capita at time t, two crisis dummies to control for the Asian Financial Crisis (1997–1999) and the Global Financial Crisis (2007–2009), and time-specific and seasonal dummies to control for the seasonal effects across time.

We first estimate the growth regression in Equation (2), where HC_t refers to the net disbursements of total household credit as a share of GDP. The coefficient β_1 captures the correlation between household credit and future income growth:

$$Y_t = \beta_0 + \beta_1 HC_t + \beta_2 X_t + \epsilon_t. \tag{2}$$

Table 1 presents the baseline estimation results for Equation (2). We find that household credit is positively correlated with future growth, whereby a 1% increase in HC_t is associated with a 0.185% increase in future GDP per capita growth.

We then disaggregate household credit into housing and consumption credit in Equation (3), in which HOC_t and COC_t refer to net disbursements of housing and consumption credit, respectively. Correspondingly, β_1 and β_2 capture the different effects of housing and consumption credit on future income growth:

$$Y_t = \beta_0 + \beta_1 (HOC_t) + \beta_2 (COC_t) + \beta_3 (X_t) + \epsilon_t. \tag{3}$$

The estimation results in Table 2 indicate that different types of household credit have varying impacts on income growth. Importantly, the positive effect of household credit seems to stem from housing credit, with a 1% increase in housing net disbursements associated with a 0.647% increase in future GDP per capita growth. We do not find a significant effect for consumption credit.

Given the positive association between housing credit and future income growth, we extend the specification to examine the significance of future housing wealth[13] as a potential channel for this positive effect, motivated by existing studies that have documented the importance of housing wealth in explaining growth (Garcia-Escribano and Han (2015) and Mian and Sufi (2016)). Similarly, in Malaysia's case, both the growth of housing wealth and GDP per capita demonstrate close co-movements (Graph 5). As seen in Table 3, once housing wealth is controlled for, the positive effect of housing net disbursements is attenuated. This suggests a non-trivial role of housing credit in affecting future income growth through the accumulation of housing wealth.[14]

Growth of GDP per capita vs growth of housing wealth, 1997-2014

Annual growth in per cent   Graph 5
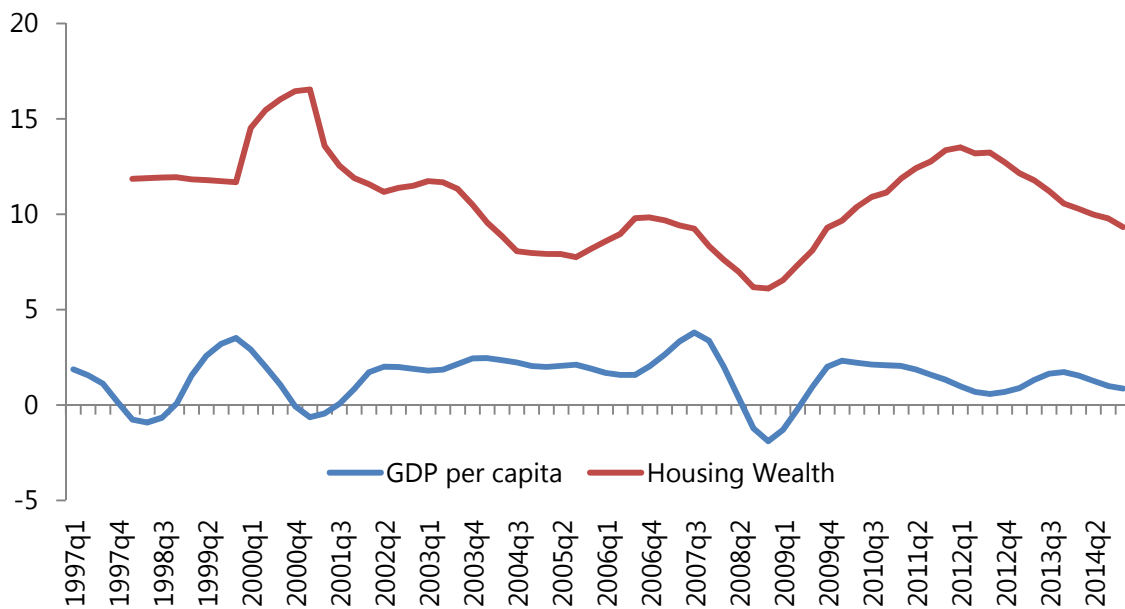
Sources: Bank Negara Malaysia; authors' estimates.

In the final part of the macro-level study on income growth, we augment the linear regression in Equation (3) to examine non-linear effects of housing credit using a simple quadratic specification. Table 4 presents the results, which show a negative and statistically significant coefficient on the quadratic term of housing net disbursements, suggesting a diminishing positive effect at higher levels of housing credit.

[13]   Similar to the future GDP per capita growth, future growth of housing wealth is calculated as the average of four-quarter ahead growth.

[14]   For robustness, we examine whether the effect of housing wealth remains significant after investment in housing is accounted for, given the direct impact of investment on GDP growth. Table 9 shows the estimation results. Due to the unavailability of data for investment in housing, we use the value of new residential properties that are under construction as a proxy for investment in housing. From the estimation, the effect of housing wealth on GDP per capita growth remains significant even after the inclusion of housing investment, suggesting a non-trivial role of housing wealth.

In sum, the macro analyses point to household credit having a positive influence on future GDP per capita growth, with most of the effect accounted for by housing credit. It is also worth emphasising housing wealth as a channel through which housing credit affects future income growth. These results are broadly in line with the findings for Malaysia by Murugasu et al (2015). Akin to our study, the authors find that housing wealth played a significant supportive role for private consumption and contributed to 16% of private consumption growth from 2005 to 2013. In contrast, consumption credit only had a small influence on private consumption growth, which was limited to the short-run period. We note, however, that the positive effect of housing credit may be non-linear and could diminish at higher levels of net disbursements.

5.1.2. Micro-level income growth analysis

Building upon the macro-level findings on income growth, we proceed to examine the effects of household credit using the combined HIES dataset. Income growth, $Y_{I09,I14}$, is represented by the change in household disposable income between 2009 and 2014. As for the credit variable, PL_{I09} refers to the percentage of households with at least one loan facility in 2009. V_I is the vector comprising a set of household characteristics that could be endogenous to income and loan-taking behaviour, including state, education level, age group and income in 2009 as a proxy for initial conditions:

$$Y_{I09,I14} = \beta_0 + \beta_1(PL_{I09}) + \beta_2(V_I) + \epsilon_t. \tag{4}$$

Similar to the macro analyses, we find a positive correlation between household credit and future income growth (Table 5). For a given group, a 10% increase in the proportion of households with a loan in 2009 is associated with a RM162 increase in the disposable income over the period of 2009-2014.

Next, we further distinguish between the two types of household credit in Equation (5). In this specification, PHL_{I09} and PCL_{I09} refer to the percentage of households with a housing loan and a consumption loan facility, respectively. The coefficients β_1 and β_2 capture the different effects of housing and consumption credit on future income growth.

$$Y_{I09,I14} = \beta_0 + \beta_1(PHL_{I09}) + \beta_2(PCL_{I09}) + \beta_3(V_I) + \epsilon_t. \tag{5}$$

The results presented in Table 6 are consistent with the macro analyses, with a significantly positive effect for housing credit and an insignificant effect for consumption credit. For a given group, a 10% increase in the proportion of households which have a housing loan in 2009 is associated with a RM273 increase in disposable income over the period of 2009-2014.

Taken together, the macro and micro analyses are consistent. While household credit has a positive effect on future income growth, distinguishing the types of credit is crucial as most of the positive effects are accounted for by housing credit.

5.2. Household credit and future income inequality

5.2.1. Macro-level income inequality analysis

We study the distributional effect of credit using a similar framework to the analyses in Section 5.1. In Equation (6), $w_{t,t+4}$ denotes the change in income inequality between t and $t+4$, which, as earlier defined, is calculated as the gap between the mean and

median real household income as a share of median income. Vector X_t is a set of controls similar to the one for the income growth specification, with an additional control variable for human capital using the secondary education enrolment:

$$w_{t,t+4} = \beta_0 + \beta_1(HOC_t) + \beta_2(COC_t) + \beta_3(X_t) + \epsilon_t. \tag{6}$$

Table 7 demonstrates the positive relationship between housing credit and future income inequality, with a 1% increase in housing net disbursements associated with a 0.406% increase in income inequality four quarters ahead. The effect of consumption credit on future inequality is insignificant, similar to the findings on income growth.

5.2.2. Micro-level income inequality analysis

In the micro-level study, based on Equation (7), $W_{I09,I14}$ represents the change in inequality over the period of 2009-2014 for each group of households:

$$W_{I09,I14} = \beta_0 + \beta_1(PHL_{I09}) + \beta_2(PCL_{I09}) + \beta_3(V_I) + \epsilon_t. \tag{7}$$

Unlike the results in the macro analysis (Table 7), here we find the effect of housing credit on future income inequality to be negative (Table 8). For a given group, a 10% increase in the proportion of households with a housing loan in 2009 is associated with a 2.8% decline in income inequality over the period of 2009-2014. On consumption credit, the estimate is again insignificant. We reconcile these two different results for housing credit in the following section.

6. Linking the empirical results

Primarily, the analyses on both income growth and income inequality highlight that different types of credit matter. For income growth, both the aggregate and household-level datasets find consistent results, with a significantly positive effect for housing credit and insignificant estimates for consumption credit.

The findings on income inequality are, however, less straightforward. Although we observe a similar case of insignificant estimates for consumption credit, the influence of housing credit differs in both datasets. At the macro level, housing credit in terms of total net disbursements is positively related to increasing income inequality. However, the micro-level analysis, which investigates the proportion of households with housing loans, finds a negative relationship with income inequality. The flow diagram in Graph 6 illustrates our interpretation regarding reconciling these two different results. The distinguishing variable is housing credit. It refers to aggregate net disbursements at the macro level, and the proportion of households with housing credit at the micro level.

Housing credit as a share of GDP may increase due to...

Channel 1	Channel 2
A higher proportion of population acquiring a housing loan	A higher volume and amount of housing loan given to the same households
Increase in housing wealth, especially	Increase in housing wealth, likely concentrated among richer households

Micro-level study captures Channel 1

Macro-level study captures net effects of Channel 1 and Channel 2

• Increase in income growth • Reduction in income inequality	• Increase in income growth • Increase in income inequality
Channel 1	**Channel 2**

Housing disbursements can increase due to the following two channels: a higher proportion of the population acquiring a housing loan (Channel 1) and a higher volume and amount of housing loan given to a particular household (Channel 2). Both channels of financing will increase the income of the agents who benefit from having access to housing wealth. We postulate that financial inclusion, which allows more households to gain access to housing credit, would likely reduce income inequality, as supported by the micro-level analysis in Section 5.2 (Channel 1). This form of credit allocation implies a greater outreach of credit, which tends to favour households in the lower income distribution and enables them to accumulate housing wealth. However, this channel can be outweighed by further accumulation of housing credit by existing borrowers, which worsens income inequality (Channel 2). The second channel would likely benefit richer households, given their ability to take on more and larger housing credit. The concentration of housing wealth among these households would, in turn, worsen income inequality. The macro-data analysis in Sections 5.1 and 5.2 captures both channels such that the net positive association of housing credit with income inequality indicates the prevalence of the second channel in the economy.[15]

Last, as a way to further validate our interpretation of the two channels and our inference that housing credit in aggregate is extended more to richer households, we leverage on the 2014 HIES dataset to examine the distribution of housing credit among Malaysian households across different income groups in Graph 7.

[15]   Another possible explanation for the difference between the micro-level and macro-level findings is the distinct indicators of credit that are used in each analysis. We are most likely capturing the intensive margin effect in the macro-level analysis, and the extensive margin effect in the micro-level analysis. However, due to data constraints, we are unable to investigate both the intensive and extensive margins in the macro- and micro-level analyses, respectively. This is left for future research.

Across the different income groups, the disparity is striking. At the lowest end of the spectrum, less than 5% of the households in the bottom 20 income quantile have at least one housing credit facility. Meanwhile, 15 to 25% of households within the 40–80 income quantile have housing credit. At the opposite end of the spectrum, almost 45% of the households in the top 20 income quantile have access to housing credit. This skewed distribution of housing credit lends support to our interpretation that, in aggregate, Channel 2 is stronger than Channel 1 given that housing credit in Malaysia is concentrated among high-income households.[16]

Distribution of households with at least one housing loan facility, 2014

As a percentage of households   Graph 7
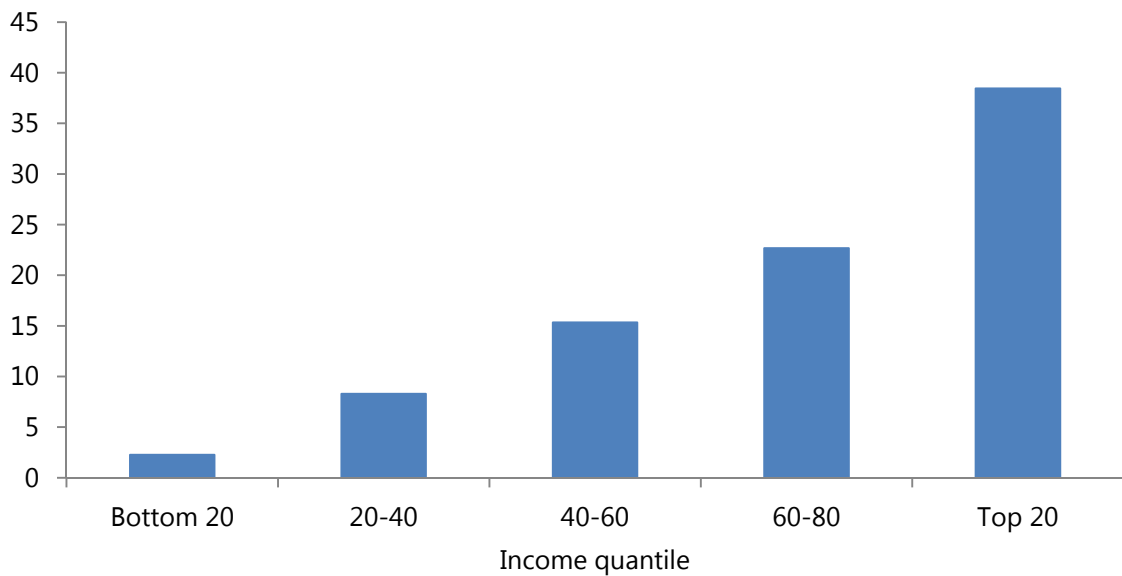
Sources: HIES 2014, Department of Statistics; authors' estimates.

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7. Conclusion

Our study emphasises the importance of recognising the different types of household credit and their varying impacts on future income growth and income inequality. For Malaysia, housing credit seems to play a more significant role in the real economy compared to consumption credit.

Of note, our study provides, in retrospect, some additional insights into the measures undertaken by Bank Negara Malaysia and the government since 2010 to

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[16]   For future research, a more thorough study could be conducted to discern the supply and demand factors driving the varying levels of housing credit across different income groups.

contain the risks of financial imbalances[17] and manage household indebtedness. First, our findings on housing credit lend weight to the targeted measures that were implemented to rein in excesses in the property market. These measures, including the maximum loan-to-value ratio for borrowers with more than two housing loans as well as the higher real property gains tax, were intended to reduce housing credit for borrowers with multiple housing loans and discourage speculative activity in the property market. Second, the measures were also supplemented by efforts to ensure continued access to financing for eligible first-time home buyers. For instance, the My First Home Scheme and 1Malaysia People's Housing Scheme (PR1MA) were introduced to encourage affordable home ownership for lower- to middle-income groups.

In addition, our findings of an insignificant impact of consumption credit on future income growth and income inequality also correspond to policies beyond the housing market. With the purpose of ensuring prudent retail financing practices and mitigating unsustainable expansion in consumption credit, measures including the implementation of maximum loan tenure for personal financing and the Guidelines on Responsible Financing were put in place. Such measures have contributed to significant moderation in personal financing loan growth.

Overall, the findings in our paper fill a research gap for the Malaysian economy by identifying the type of household credit that matters for income growth and income inequality in Malaysia. Our empirical findings and the observations from the housing credit distribution could serve to inform the calibration of policies, especially those in relation to the broader discussion of household indebtedness and developments in the housing market.

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[17]   For a more comprehensive discussion, refer to the Box Article "Financial imbalances and policy responses in Malaysia" in Bank Negara Malaysia's 2014 Annual Report.

Effect of household disbursements on GDP per capita growth

Table 1

	Future GDP per capita growth (4-quarter ahead average)
Household net disbursements (% of GDP)	0.185**
	(0.089)
Dependency ratio	0.435
	(0.354)
Saving (% of GDP)	0.358**
	(0.085)
Openness to trade	−1.443
	(1.591)
Log GDP per capita	−24.355**
	(4.217)
Observations	72
Sample period	1997Q1–2014Q4

Notes: GDP per capita growth is the average of the 4-quarter ahead growth. Net disbursements as a share of GDP is the total net disbursed by the banking system and development financial institutions (DFI) to households. Newey-West standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Effect of housing and consumption disbursements on GDP per capita growth

Table 2

	Future GDP per capita growth (4-quarter ahead average)
Housing net disbursements (% of GDP)	0.647**
	(0.219)
Consumption net disbursements (% of GDP)	−0.094
	(0.086)
Dependency ratio	−0.289
	(0.295)
Saving (% of GDP)	0.341**
	(0.078)
Openness to trade	−1.929
	(1.562)
Log GDP per capita	−26.513**
	(3.780)
Observations	72
Sample period	1997Q1–2014Q4

Notes: GDP per capita growth is the average of the 4-quarter ahead growth. Net disbursements as a share of GDP is the total net disbursed by the banking system and development financial institutions (DFI) to households. Newey-West standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Housing wealth channel for housing net disbursements

Table 3

	Future GDP per capita growth (4-quarter ahead average)
Housing net disbursements (% of GDP)	0.177**
	(0.088)
Growth in housing wealth	0.132**
	(0.028)
Consumption net disbursements (% of GDP)	−0.074
	(0.048)
Dependency ratio	−0.426**
	(0.178)
Saving (% of GDP)	0.283**
	(0.057)
Openness to trade	2.015**
	(0.630)
Log GDP per capita	−32.34**
	(2.348)
Observations	72
Sample period	1997Q1–2014Q4

Notes: GDP per capita growth is the average of the 4-quarter ahead growth. Net disbursements as a share of GDP is the total net disbursed by the banking system and development financial institutions (DFI) to households. Newey-West standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Effect of housing disbursements (quadratic) on GDP per capita growth

Table 4

	Future GDP per capita growth (4-quarter ahead average)
Housing net disbursements (% of GDP)	3.026**
	(0.399)
Housing net disbursements (Squared)	−0.573**
	(0.085)
Dependency ratio	−0.014
	(0.245)
Saving (% of GDP)	0.389**
	(0.071)
Openness to trade	−2.417**
	(1.091)
Log GDP per capita	−28.59**
	(2.955)
Observations	72
Sample period	1997Q1–2014Q4

Notes: GDP per capita growth is the average of the 4-quarter ahead growth. Net disbursements as a share of GDP is the total net disbursed by the banking system and development financial institutions (DFI) to households. Newey-West standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Effect of household loan inclusion on change in disposable income

Table 5

	Change in disposable income (2009-2014)
% of population with loan 2009	16.158**
	(5.829)
State	47.388
	(42.914)
Education	698.484**
	(151.469)
Age group	4.726
	(53.737)
Disposable income 2009	−0.559**
	(0.189)
Observations	412
Sample period	2009–2014

Notes: The change in disposable income is the difference between the median income in 2014 and 2009 for each household group. Household groups are constructed using the head of household's state location, education level and age group in the 2014 and 2009 HIES datasets. Clustered standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Effect of housing and consumption loan inclusion on change in disposable income

Table 6

	Change in disposable income (2009-2014)
% of population with housing loan 2009	27.283**
	(8.461)
% of population with consumption loan 2009	9.764
	(6.082)
State	57.273
	(45.281)
Education	706.111**
	(138.026)
Age group	5.727
	(53.530)
Disposable income 2009	−0.593**
	(0.191)
Observations	412
Sample period	2009–2014

Notes: The change in disposable income is the difference between the median income in 2014 and 2009 for each household group. Household groups are constructed using the head of household's state location, education level, and age group in the 2014 and 2009 HIES datasets. Clustered standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Effect of housing and consumption disbursements on income inequality
Table 7

	Increase in future income gap (4 quarters ahead)
Housing net disbursements (% of GDP)	0.406**
	(0.076)
Consumption net disbursements (% of GDP)	0.027
	(0.074)
Dependency ratio	1.185**
	(0.366)
% of enrolment in secondary education	−0.053**
	(0.021)
Saving (% of GDP)	0.094
	(0.075)
Openness to trade	−0.393
	(1.516)
Log GDP per capita	1.534
	(2.666)
Observations	72
Sample period	1997Q1–2014Q4

Notes: Inequality is defined as the gap between mean and median income as a share of the median income. The dependent variable is the change in the gap over a period of four quarters. Net disbursements as a share of GDP is the total net disbursed by the banking system and development financial institutions (DFI) to households. Newey-West standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Effect of housing and consumption loan inclusion on income inequality
Table 8

	Increase in income gap (2009–2014)
% of population with housing loan in 2009	−0.281**
	(0.092)
% of population with consumption loan in 2009	0.078
	(0.101)
State	−0.013
	(0.336)
Education	0.324*
	(2.811)
Age group	1.136
	(1.106)
Disposable income, 2009	0.002
	(0.001)
Observations	412
Sample period	2009–2014

Notes: Income gap is defined as the gap between mean and median income, as a share of median income, for each household group. The dependent variable is the difference between the income gap in 2014 and 2009 for each household group. Household groups are constructed using the head of household's state location, education level, and age group in the 2014 and 2009 HIES datasets. Clustered standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Housing wealth channel for housing net disbursements (robustness)
Table 9

	Future GDP per capita growth (4-quarter ahead average)
Housing net disbursements (% of GDP)	0.125*
	(0.062)
Growth in housing wealth	0.101**
	(0.030)
Growth in construction starts (residential property value)	−0.001
	(0.002)
Consumption net disbursements (% of GDP)	−0.011
	(0.059)
Dependency ratio	−0.484**
	(0.175)
Saving (% of GDP)	0.293**
	(0.059)
Openness to trade	1.774**
	(0.758)
Log GDP per capita	−36.807**
	(2.430)
Observations	72
Sample period	1997Q1–2014Q4

Notes: GDP per capita growth is the average of 4-quarter ahead growth. Net disbursements as a share of GDP is the total net disbursed by the banking system and development financial institutions (DFI) to households. Newey-West standard errors are reported in parentheses. ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Unit root test for selected macro-variables
Table 10

	p-value
GDP per capita growth	0.001
Household net disbursements (% of GDP)	0.000
Housing net disbursements (% of GDP)	0.000
Consumption net disbursements (% of GDP)	0.004
Growth in housing wealth	0.039
Increase in income gap	0.068
Sample period	1997Q1–2014Q4

Notes: Augmented Dicker-Fuller test is conducted on the main macro-level variables to check for possible non-stationarity. The optimal lag for each variable is chosen based on the modified Akaike information criterion. Based on the p-values of all the variables, we can reject the null hypothesis of a unit root at 10% significance level.

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Comments on "Household credit, growth and inequality in Malaysia: does the type of credit matter?"

Yongheng Deng[1]

Summary

The paper provides an empirical assessment of alternative household credit policy measures (ie housing vs consumption credit) which have been put in place by the Malaysian government since 1997. Malaysia's household debt as a percentage of GDP has doubled from 43% to 89% since 1997. During the past two decades, there has been a gradual shift away from consumption credit towards housing credit. The share of housing credit as a proportion of the total banking system's household loans has increased from 36% in 1997 to 51% in the first quarter of 2016.

Using both macro data and unique micro-level household survey data, the authors examined the impact of housing credit and consumption credit on income growth and income inequality.

Empirical strategy

In the macro analysis, the base model is built upon a growth model specified in equation (4) of the paper, such that

$$\bar{y}_t = \beta_0 + \beta_1 \left(HoC_t \right) + \beta_2 \left(CoC_t \right) + \beta_3 \left(X_t \right) + \varepsilon_t,$$

and an income inequality model specified in equation (7) of the paper, such that

$$w_{t,t+4} = \beta_0 + \beta_1 \left(HoC_t \right) + \beta_2 \left(CoC_t \right) + \beta_3 \left(X_t \right) + \varepsilon_t,$$

and the covariates X_t include the savings-to-GDP ratio, the dependency ratio, openness to trade, log GDP per capita, external shocks (such as crisis dummies), a time fixed effect and a measure of housing wealth.

In the micro-level analysis, the authors merged the 2014 Household Income and Expenditure Survey (HIES) with the 2009 HIES according to three common variables, including 15 states, four levels of education and nine age groups for the head of household.

For each respective group, the authors computed the median and mean of disposable income, and then constructed the two key variables: *growth* and *inequality*. Income growth measures the change in median household disposable income between 2009 and 2014, and the change in income inequality measures the change in mean and median disposable income gap between 2009 and 2014.

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The authors then estimated the base income growth/inequality models as specified in equations (6) and (8) of the paper, such that

$$y_{i_{09},i_{14}} = \beta_0 + \beta_1 \left(PHL_{i_{09}} \right) + \beta_2 \left(PCL_{i_{09}} \right) + \beta_3 \left(V_i \right) + \varepsilon_{i_t}$$

$$w_{i_{09},i_{14}} = \beta_0 + \beta_1 \left(PHL_{i_{09}} \right) + \beta_2 \left(PCL_{i_{09}} \right) + \beta_3 \left(V_i \right) + \varepsilon_{i_t}.$$

Key empirical findings

The study found that housing credit is positively associated with future income growth, while consumption credit shows no significant evidence. The paper suggested at the macro level that financial inclusion which improves the access to housing credit for more households would likely reduce income inequality.

The household survey data suggested that the accumulation of housing credit for existing borrowers may worsen income inequality given the likely concentration of housing wealth among richer households.

Main takeaways

The authors suggested that housing credit would affect not only households' current balance sheet position, but also their future flow of income and wealth depending on asset price movements. In other words, housing is treated as an investment good, hence housing credit acts to provide stimulus to increase investment. However, consumption credit such as personal and passenger vehicle loans, while facilitating households' current expenditure more directly, has less of an influence and impact on asset accumulation.

Comments

Macro analysis

Given that the housing sectors (both real and housing finance) are of key interest in this analysis, the measurement of income growth is essential as it may reflect the housing boom during the sampling period. As reported in Table 2, housing net disbursement (as a percentage of GDP) has a point estimate of 0.715 and is highly significant (*p*-value 0.004). Nevertheless, in Table 3, after controlling for housing wealth, the point estimate for housing net disbursement drops to 0.263 and is now only marginally significant (*p*-value 0.045).

A more sophisticated modeling strategy is warranted here to account for potential endogeneity, for example, interaction between income growth, housing wealth, household credit, and income inequality.

The author can follow the existing literature to improve the model such that the new analysis will account for the interaction between income growth, housing wealth and household credit. For example, in the seminal paper by Case, Quigley, and Shiller (2005), it was reported and widely observed that changes in stock prices are associated with changes in national consumption. There is every reason to expect that changes in housing wealth exert effects upon household behavior that are quite

analogous to those found for stock market wealth. Case, Quigley, and Shiller (2005) found that a 10 percent increase in housing wealth increases consumption by roughly 1.1 percent for the international panel. Using an error correction model analysis, they found that the immediate effect of a 10 percent increase in housing wealth is an increase in consumption of 1 percent for the panel of western countries. Absent a second shock, the effect of the 10 percent increase in housing wealth is reduced to 0.3 percent after four quarters and to 0.2 percent after 10 quarters.

Micro-level analysis

The findings on income inequality reported by the authors are less straightforward. Figure 6 of the paper suggested that housing credit as a share of GDP may increase either through a large proportion of poorer households obtaining a housing loan, which may narrow income inequality, or a bigger proportion of loans being distributed among wealthier households, which may lead to an increase in income inequality. There can be a third channel such that when housing price growth outpaces income growth, there will be a widening in income inequality as the burden of housing affordability will tend to disproportionately impact poorer households, affecting them more severely due to income constraints.

It would be useful, revealing and also very interesting for the authors to tabulate the distribution (ie, report the median, as well as the 10th, 25th, 50th, 75th and 90th percentiles) of key variables of the HIES 2009 and 2014, such as income, property value and size, consumption, saving, non-housing (stock/bond), investment, outstanding balance of mortgages, mortgage payment-to-income ratio, other household debt, total debt-to-income ratio, as well as the conditional distribution of the above by income, age, and education cohorts.

By comparing the changes of the distributions between 2009 and 2014, as well as the changes of the distributions by income, age, and education groups during this period, such tables of distribution can provide rich and meaningful information.

Campbell and Cocco (2007), in their highly influential paper which used UK data on individual households, found a statistically significant impact of housing prices on consumption among older homeowners, but no significant impact among young renters.

More general comments

The simple comparison of changes in the raw distribution as suggested above might provide us with some useful insights on how, through the varying channels, structures, and mechanisms, different credit policy measures may come to impact income growth and income inequality.

As a follow-through, in a second stage, the authors could then test the hypothesis observed from these tabulations of income/wealth/debt using the current growth model.

This would allow the authors to extend the current modeling framework by more carefully addressing the endogeneity issues as well as testing for behaviors which are peculiar to each of the policy target groups. It would also allow the authors to disentangle income growth from the housing boom effect, as discussed in the

previous section, through a careful natural experimental design of the micro-level sample, through different income distributions or by age cohorts.

In addition to the analysis based on the merged sample, by cohorts, of three common identifiers, the author may also consider leveraging on the richness of the unmerged raw sample, by exploring the longitudinal time varying information among the households in the sample (see Deng, Quigley, and Van Order (2000) for an example of modeling household/loan level longitudinal analysis).

Moreover, as the size of housing credit is typically much larger compared to that of consumption credit, it would be useful to rescale these two credit variables in the sample, so that the process of estimation could be made less strenuous and more manageable. Interpretations of the estimation analyses would also be more meaningful.

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Corporate leverage in emerging Asia[1]

Vidhan Goyal[2] and Frank Packer[3]

Abstract

This paper examines the leverage of firms of seven economies in emerging Asia – Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand – between 1991 and 2015. For the sample as a whole, neither the mean nor median, nor the upper tails of the leverage distribution show any upward shift in recent years. Corporate leverage appears quite stable across most jurisdictions, but not all. Standard firm characteristics such as asset tangibility and size explain leverage differences across the whole sample and within jurisdiction. Factors that help to overcome informational asymmetries may be less important in jurisdictions with stronger institutions.

Keywords: corporate finance, capital structure, leverage

JEL classification: G30, G32

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1. Introduction

The rising debt burdens of corporations in emerging market economies (EMEs) are of increasing concern to policymakers and market participants alike. The non-financial corporate debt of EMEs rose from 58% of GDP in 2007 to 96% in 2015, surpassing the ratio in advanced economies (See Graph 1 based on data from the Bank for International Settlements (2016)). The accumulation of corporate debt has been even more marked in the subsample of EMEs in Asia-Pacific. Trends such as these hark back to the Asian financial crisis of the late 1990s, memories of which still linger in the region.[4]

Corporate debt of advanced economies and emerging market economies

As a percentage of GDP   Graph 1
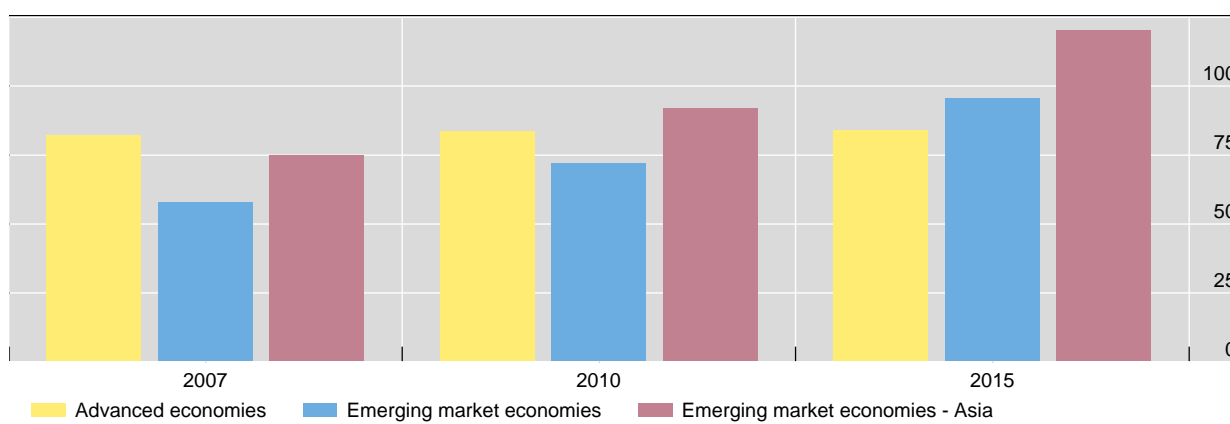
Corporate debt is best viewed as high or low relative to the assets – including equity – that are available to support that debt. For that reason, we focus on corporate leverage measures that take into account such support, estimated both with book and market values of equity. Moreover, we look beyond averages to focus on leverage distributions in assessing system vulnerabilities. In particular, changes in leverage of the upper tail of leverage distribution can often be more informative about the sensitivity of bankruptcy rates and financial distress to aggregate shocks. In this respect, we follow the analysis of Bernanke and Campbell (1988), who addressed widespread worries about the rise of US corporate debt in the late 1980s.

Our focus is on examining the capital structure decisions of listed firms in emerging Asia with a view to understanding the extent to which recent increases in debt have outpaced those of equity and historical norms. In the process, we also provide a more granular understanding of the determinants of debt levels and debt changes of firms in Asia. Our analysis is based on publicly listed firms in Hong Kong

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[4]   Although macroprudential policies have been enacted in many jurisdictions to control the quality, quantity and procyclicality of lending, these measures frequently target household mortgage debt rather than the provision of credit to corporations. In addition, corporations are increasingly relying on bond markets and in particular, foreign bond markets, which are often out of reach of the macroprudential policymakers. In what has been identified as the "second phase of global liquidity", bond markets have assumed a greater role in transmitting global financial conditions across borders. See Shin (2013).

SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand, and covers the period from 1991 to 2015.

Our results can be summarised as follows:

1. For the sample as a whole, when corporate debt is measured relative to assets, we find little evidence of an increase in leverage in the more recent period. While corporate debt has increased, so have assets including both book and market equity on firms' balance sheets. Contrary to the more common view that Asian firms have become excessively leveraged in recent years, we find that corporate leverage across the entire sample of Asian firms is remarkably stable. This contrasts sharply with what we observed ahead of the Asian financial crisis of the late 1990s.

2. Over the past half-decade as well as earlier, firms in Indonesia, Korea and Thailand have carried relatively more debt than firms in Hong Kong SAR, Malaysia, the Philippines and Singapore. But among these three economies with high firm-level leverage, the current average debt levels are much lower than those observed prior to the Asian financial crisis. Market leverage did increase during the recent global financial crisis, but these are largely an artefact of a transitory drop in equity values of firms during the crisis. In the more recent period from 2010, both book and market leverage are similar to levels observed in the previous decade.

3. For the entire sample, the 90th and 95th percentiles of the distributions of leverage do not seem to have increased faster than the median. In other words, there is no tendency for the upper tail of distribution of leverage to have shifted out. However, for the individual jurisdictions of Hong Kong SAR, Singapore and the Philippines, book leverage measured at the higher ends of the distribution has risen over the past five years, and is over or close to all-time highs for those jurisdictions. It remains to be seen whether or not this is due to the changing industry composition of firms in those jurisdictions.

4. Among firms listed in Hong Kong SAR, there is a noticeable difference between firms headquartered locally in Hong Kong SAR over the sample period, and those headquartered elsewhere, almost all in mainland China. Not only is leverage much higher among non-local firms, but the recent increases to high levels are more marked.

5. Leverage is positively related to industry median leverage, firm size and tangibility of assets, and negatively related to profitability and market-to-book assets ratio. Firm characteristics explain a significantly greater proportion of cross-sectional variation in leverage in Indonesia, Korea, the Philippines and Thailand and less so in other jurisdictions. We surmise that firm characteristics such as firm size and tangibility are more weakly related to leverage in countries that are more developed and have stronger institutions.

The remainder of the paper proceeds as follows. We review the relevant empirical and theoretical literature in Section 2. In Section 3, we describe and summarise the corporate finance, country and global data employed in the study. Section 4 sets up and reports estimates from regressions of leverage on firm characteristics. We conclude with a summary of findings and issues for further investigation in Section 5.

2. Literature review

The determinants of the capital structure of firms internationally are an increasingly well researched topic. Despite the institutional differences in financial systems documented among countries, Rajan and Zingales (1995) identified four firm factors which had been important in studies focused in the United States – size, profitability, asset tangibility and market-to-book ratios – to be also generally important in regressions of G7 countries. Motivated by the work on US firms by Frank and Goyal (2009), two additional factors, median industry leverage and inflation, have been added to the set of "reliably important" factors for international firms (Öztekin (2015)). Other work focuses on institutional development and swings in risk-taking and global liquidity in determining international corporate leverage, but these are not the focus of this paper.[5]

Studies assessing the determinants of leverage have also frequently tested theories of corporate capital structure, most commonly the trade-off theory which sees capital structure as a balance of tax advantages versus the higher agency and bankruptcy costs that generally accrue to debt contracts (Myers (1977) and Stulz (1990)), as well as the pecking order theory which sees internal finance as usually preferred to external finance because of costs related to adverse selection costs, and debt finance as preferred to equity among external financing methods (Myers (1984) and Myers and Majluf (1984)). Frank and Goyal (2003) and Frank and Goyal (2009) have found the US data to be more supportive of trade-off theory than the pecking order theory; while Booth et al (2001) and Gungoraydinoglu and Öztekin (2011) have found some evidence in the international data consistent with both the trade-off and the pecking order theories. In this paper, we find the relationship of leverage with explanatory variables that is consistent with the various theories, but do not focus on the degree of explanatory power of one theory versus the other.

3. Data and summary statistics

We start with a discussion of average balance sheets of Asian firms and present a first look at cross-country differences in the asset and liability structure of firms. Section 3.1 describes our data sources and the resulting sample. Section 3.2 summarises leverage ratios and financing variables, while Section 3.3 presents summary statistics of firm characteristics. The statistics are disaggregated at the country level and for various subperiods of interest.

3.1 Data, sample and average balance sheets

Firm-level accounting data are from Worldscope and the stock market data are from Datastream. The period is 1991–2015. In addition, we obtain country-level variables from various sources, including the Doing Business database available through the World Bank and World Economic Outlook from the IMF.

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[5]   See Booth et al (2001), Gungoraydinoglu and Öztekin (2011) and Öztekin (2015) for an in-depth discussion of cross-country institutional differences and leverage, and Kalemli-Ozcan et al (2012) and International Monetary Fund (2015) for the role of swings in risk-taking and global liquidity.

We exclude observations with missing or zero asset values. We also exclude financial firms (6000–6999) and utilities (4000–4999). We require firms to have data on book leverage and market leverage to be included in our analysis. The financial accounts are deflated using the consumer price index for each country from the World Development Indicators database from the World Bank. All ratio variables are winsorised at 0.5% in either tail of the distribution.

Table I presents the distribution of countries in our sample. The sample includes firms from Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. We have 7,310 firms from seven economies with a total of 81,849 firm-year observations. The average panel length is 11.2 years. Korea has relatively more firms in the sample, while the Philippines has fewer. Despite these differences, we do not see any particular economy making an outsized influence on our sample. While the panel length varies from one year to 24 years, both the mean and median panel lengths range between nine and 12 years.

Sample distribution   Table I

Jurisdiction	# of firms	# of firm-year observations	Average panel length	Median panel length
Hong Kong SAR (HKG)	1,631	16,740	10.3	10.0
of which: local	*1,155*	*12,462*	*10.8*	*11.0*
non-local	*476*	*4,278*	*9.0*	*8.0*
Indonesia (IDN)	492	6,070	12.3	12.0
Korea (KOR)	1,992	20,260	10.2	10.0
Malaysia (MYS)	1,071	13,136	12.3	12.0
Philippines (PHL)	206	2,604	12.6	12.5
Singapore (SGP)	956	10,995	11.5	11.0
of which: local	*718*	*8,098*	*11.3*	*11.0*
non-local	*238*	*2,897*	*12.2*	*10.0*
Thailand (THA)	962	12,044	12.5	12.0
Total	7,310	81,849	11.2	11.0

Note: This table reports the distribution of firms and firm-year observations by country in our sample. The last two columns provide the mean and median panel length for firms in the sample. We exclude financial firms, utilities, and observations with asset values that are either missing or zero.

Appendix Table A1 reports the average balance sheet as a fraction of assets for publicly traded firms in each of the seven economies. Surprisingly, the balance sheets are not all that different and firms have very similar asset and liability structures despite significant differences in geography and institutions.

This is not to say that nothing stands out in this comparison. Firms in Hong Kong SAR and Singapore hold relatively more cash, have more current assets and fewer fixed assets. On the other hand, firms in the Philippines hold less cash, have fewer receivables, but significantly higher levels of fixed assets. On the liability side, we see significant differences in use of short-term debt – firms in Korea and Thailand have more short-term debt while firms in Hong Kong, the Philippines, Malaysia and Singapore have less. Firms in Indonesia and Thailand use relatively more long-term debt. Overall, debt levels are higher for firms in Indonesia, Korea and Thailand.

3.2 Leverage ratios

In the introduction, we reviewed concerns about the recent growth of debt in Asia-Pacific. However, the risks of debt outstanding are most appropriately measured relative to the assets that support them. We therefore use two leverage measures for our firm-level analysis, book leverage and market leverage. Academic opinion is divided on which is the most appropriate. Reasons for choosing book leverage include the view that assets in place provide better support to debt than growth opportunities (Myers (1977)) and the tendency of managers not to adjust capital structure in response to swings in the stock market (Graham and Harvey (2001)). Market leverage advocates view the book value of equity to be backward-looking and not managerially relevant (Welch (2004)).[6]

We define book leverage as the book value of debt divided by debt plus book equity. We define market leverage as the book value of debt divided by debt plus market equity. Welch (2011) argues that leverage ratios constructed using total assets suffer from the problem that total assets include the value of non-financial liabilities such as trade credit. Our leverage definitions are thus not affected by changes in non-financial liabilities. We require all firm-level leverage measures to have values between zero and one.

We start with an examination of changes over time and across countries in the mean leverage ratios for the sample firms (Table II, panels A and B). In addition to the entire period, we examine the subperiods of 1991–98, 1999–2007, 2008–09 and 2010–15. One clear point from the table is that, in sharp contrast to the rising corporate debt-to-GDP ratios discussed earlier, leverage is remarkably stable over time and across all economies. The mean leverage has steadily declined over time across the sample. With the exception of Hong Kong SAR and Singapore, where book leverage measures during the recent period are somewhat greater than those at the time of the global financial crisis, all leverage measures in the 2010–15 period are lower than they were during 2008–09. In fact, the leverage of Asian firms is significantly below the historical numbers observed in the 1990s. Indeed, leverage was quite elevated for almost all economies before the Asian financial crisis but has since then steadily declined.

We find similar trends for both book leverage (Panel A) and market leverage (Panel B). For market leverage, firms in the recent period were significantly less levered than they were during 2008–09. Only Singapore and Malaysia score market leverage measures that are somewhat higher than those before the Asian financial crisis.

Among the sample countries, we can divide the sample into two groups. The "high leverage" group includes firms from Indonesia, Korea and Thailand, which in terms of country long-term averages, range between 34% and 37% for book leverage and between 31% and 36% for market leverage. By contrast, the remaining four countries of Hong Kong SAR, Malaysia, the Philippines and Singapore range lower, between 25% and 27% for book leverage, and between 25% and 29% for market leverage.

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[6] Academic studies that examine both book and market leverage measures report that the two measures behave similarly (Rajan and Zingales (1995), Fama and French (2002) and Leary and Roberts (2005)). DeAngelo and Roll (2015) note the high correlation between book and market leverage and conclude that "there is not much incremental information in the market series" (p 377).

Mean leverage ratios for Asian firms, 1991–2015　　　　　　　　　　　　　　　　　　　　　Table II

	Period	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand	Hong Kong SAR	All Firms
Panel A: Book Leverage									
	Book Lev	0.368	0.339	0.268	0.253	0.272	0.339	0.253	0.300
Subperiods	1991-1998	0.430	0.616	0.292	0.308	0.289	0.463	0.280	0.388
	1999-2007	0.391	0.329	0.287	0.274	0.276	0.340	0.240	0.300
	2008-2009	0.354	0.324	0.270	0.207	0.249	0.295	0.235	0.282
	2010-2015	0.320	0.306	0.234	0.211	0.267	0.291	0.264	0.278
Panel B: Market Leverage									
	Market Lev	0.346	0.363	0.286	0.260	0.271	0.307	0.251	0.303
Subperiods	1991-1998	0.385	0.642	0.223	0.285	0.245	0.417	0.290	0.360
	1999-2007	0.383	0.378	0.305	0.328	0.264	0.326	0.235	0.311
	2008-2009	0.372	0.365	0.344	0.227	0.288	0.321	0.249	0.319
	2010-2015	0.284	0.306	0.263	0.171	0.286	0.228	0.257	0.271
Panel C: Number of Observations - Leverage									
	Num Obs	6,070	20,260	13,136	2,604	10,995	12,044	16,740	81,849
Subperiods	1991-1998	1,080	1,447	1,578	441	1,619	2,047	1,666	9,878
	1999-2007	2,178	7,133	5,689	1,060	4,453	4,592	6,227	31,332
	2008-2009	616	2,636	1,559	257	1,323	1,273	1,905	9,569
	2010-2015	2,196	9,044	4,310	846	3,600	4,132	6,942	31,070

Note: Mean leverage ratios for Asian firms. The sample period is from 1991 to 2015. The variables are defined in the Appendix.

Even among the high-leverage countries, leverage in Korea stood out in the early 1990s, averaging over 60% for both book and market leverage ahead of the Asian financial crisis. However, subsequent to the crisis, leverage fell below 40% to levels similar to those of Indonesia and Thailand. The average leverage of firms in those two countries also fell significantly after the Asian financial crisis, as generally did that of the other "low-leverage" jurisdictions.

By contrast, leveraging ahead of the 2008–09 crisis is not readily apparent at the country level for our sample of country averages. The market leverage of all jurisdictions jumped in 2008–09 across the board (the Philippines in 2008 alone), but this reflected a collapse in global equity markets, and leverage ratios continued a steady decline thereafter. Overall, the results parallel the findings of Kalemli-Ozcan et al (2012) across a sample covering firms in more than 60 countries. They concluded that "ahead of the global financial crisis there were no visible increases in leverage for the typical non-financial firm".

On the whole, the leverage summary statistics underscore the importance of measuring debt burdens relative to the quantity of assets available to support them. Whereas in the introduction, we saw evidence of uniformly increasing corporate debt since the global financial crisis, both absolutely and compared to GDP, the increases in leverage in our sample of Asia-Pacific jurisdictions we study are much less marked

and widespread when measured as a percentage of assets. In fact, the debt burdens for our sample of listed companies in the Asia-Pacific are generally far below what we document ahead of the Asian financial crisis and are well within historical ranges.

To be sure, mean leverage ratios based on aggregates do not capture the distribution of debt burdens across firms. To the extent we are interested in the likelihood of a surge in defaults and bankruptcies if the economies under investigation were to slow down or be hit by a shock, it makes sense to also examine the upper tails of the distribution in terms of leverage. Table III reports the mean, median, 90th and 95th percentiles of book and market leverage by year for the entire sample. Both book and market leverage rose sharply in the mid- to late 1990s. Leverage then declined following the Asian financial crisis – both for the median firm but also for firms in the upper tails of the distribution. There has been no significant trend in both leverage measures since then. Even in 2015, when mean and median book leverage rose, similar measures of market leverage declined.

Distribution of corporate leverage   Table III

	Book Leverage				Market Leverage			
Year	Mean	Median	90th %ile	95th % ile	Mean	Median	90th %ile	95th % ile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1991	0.307	0.278	0.676	0.747	0.255	0.182	0.667	0.771
1992	0.330	0.306	0.676	0.762	0.259	0.199	0.615	0.758
1993	0.359	0.362	0.685	0.763	0.246	0.192	0.598	0.704
1994	0.362	0.359	0.681	0.757	0.274	0.238	0.587	0.671
1995	0.376	0.391	0.687	0.747	0.319	0.280	0.678	0.761
1996	0.399	0.412	0.712	0.774	0.354	0.317	0.752	0.828
1997	0.449	0.459	0.828	0.884	0.494	0.513	0.910	0.951
1998	0.421	0.415	0.815	0.900	0.483	0.519	0.890	0.942
1999	0.369	0.351	0.752	0.853	0.386	0.365	0.810	0.884
2000	0.337	0.314	0.709	0.834	0.400	0.369	0.846	0.912
2001	0.322	0.290	0.688	0.798	0.366	0.326	0.799	0.876
2002	0.308	0.276	0.657	0.779	0.361	0.317	0.793	0.869
2003	0.299	0.268	0.639	0.737	0.298	0.242	0.712	0.801
2004	0.289	0.269	0.609	0.706	0.299	0.242	0.693	0.790
2005	0.285	0.259	0.612	0.701	0.284	0.230	0.665	0.761
2006	0.281	0.259	0.598	0.680	0.266	0.212	0.635	0.727
2007	0.272	0.248	0.596	0.678	0.244	0.183	0.601	0.704
2008	0.292	0.272	0.622	0.719	0.361	0.338	0.773	0.838
2009	0.272	0.241	0.600	0.700	0.278	0.229	0.658	0.756
2010	0.267	0.239	0.583	0.676	0.257	0.205	0.605	0.704
2011	0.276	0.251	0.593	0.680	0.290	0.236	0.672	0.750
2012	0.280	0.256	0.594	0.698	0.278	0.225	0.651	0.745
2013	0.282	0.252	0.606	0.698	0.274	0.216	0.652	0.744
2014	0.281	0.251	0.601	0.692	0.265	0.202	0.641	0.743
2015	0.285	0.262	0.617	0.705	0.262	0.193	0.645	0.745
All Years	**0.300**	**0.277**	**0.637**	**0.735**	**0.303**	**0.246**	**0.709**	**0.801**

Note: Distribution of book and market leverage for Asian corporations, 1991–2015.

Overall, the measures of leverage at the higher points of the distribution show similar historical patterns to those of the mean. The higher percentiles of the leverage distributions do not appear to have risen significantly in recent years, being range-bound since the global financial crisis, moving up somewhat in the case of book leverage measures, and edging down slightly in the case of market leverage measures. Further the current ranges are well below those during the late 1990s and early 2000s, in the lead-up and aftermath of the Asian financial crisis. In fact, only for market leverage numbers in the first half of the 1990s do we see numbers for firms in the higher percentiles in the same range as today. In sum, without a strong prior that the market value of equity is at present greatly overstating estimates of future earnings, both the medians and higher percentiles do not point towards undue solvency risks at present for the sample on the whole.

By and large, the same results hold for individual jurisdictions, though a few important exceptions should be noted (Appendix Tables A2–A12). In Hong Kong SAR, the higher percentiles of book leverage have risen considerably over the past five years of available data to a point where the latest observations now well exceed the long-term averages and are also above the previous peaks ahead of the Asian financial crisis. When the sample of listed firms in Hong Kong SAR is broken up into subsamples of firms headquartered in Hong Kong SAR and firms headquartered outside Hong Kong SAR (almost all in China), it is clear that the non-local firms have significantly larger increases in leverage than local firms for both book and market leverage at the higher percentiles.[7] Further, in contrast to the local firm results, the means and medians are quite high as well. This strongly suggests that an extension of the study to the many listed firms of China would have yielded much less sanguine results.

Exceptional increases at the higher percentiles for book leverage can also be noted in recent years for Singapore and the Philippines. In Singapore, market leverage is also quite high, and once again the more pronounced increases are evident for non-local firms. In the Philippines, while the 90% and 95% percentile measures for corporate book leverage have increased to historically high ranges, they have not yet exceeded the ratios of 1997. In future work, it will be of interest to investigate the extent to which increases in leverage in the above-mentioned three jurisdictions represent increases in leverage across industries, or increases over time in the proportion of firms in highly leveraged industries.

3.3 Firm characteristics

While the capital structure literature identifies a large number of variables that appear correlated with leverage, Frank and Goyal (2009) find that only a small number of factors are empirically robust. According to Frank and Goyal, the most reliable factors for explaining leverage are (firm) size, profitability, tangible assets, market-to-book ratio and industry leverage. In a recent paper, Öztekin (2015) confirms that these are also the most reliable factors for countries around the world.

Tangibility is defined as the ratio between the value of property, plant and equipment (PPE) and total assets. Tangible assets are easier to collateralise largely because distress costs are usually smaller when assets are tangible. From the tax-

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[7]   This phenomenon has also been noted by Hong Kong Monetary Authority (2016).

bankruptcy costs trade-off perspective, tangibility reduces the costs of financial distress and hence results in higher leverage.

Size is estimated as the natural logarithm of book value of total assets (in real US dollars). The theory predicts that larger firms will have higher leverage since larger firms are more diversified and have lower default risk. Profitability is defined as operating income scaled by total assets. The trade-off theory predicts that profitability should be positively related to leverage since expected bankruptcy costs are lower and interest tax shields more valuable for profitable firms.

The empirical studies typically find a negative relation between profitability and leverage. Frank and Goyal (2015) show that the negative relation is consistent with the trade-off theory since adjustment costs imply that debt adjustment do not completely offset profitability shocks and the ratio of debt to capital declines.

Market-to-Book Ratio is defined as the ratio between the market value of total assets and the book value of the firm. The trade-off theory predicts a negative relation between leverage and growth because financial distress and underinvestment are more severe for high-growth firms. In addition, incentives to substitute risky assets for safe assets are also higher for firms with greater growth opportunities. We expect a negative relation between leverage and market-to-book ratios. Detailed variable definitions are given in Appendix A.

Table IV examines the cross-section and time-series of the most important leverage factors across all seven jurisdictions (size, profitability, asset tangibility and market-to-book ratio) as well as for the same subperiods identified for leverage earlier. In terms of the cross-sectional differences, it is not immediately apparent that the difference in the long-run average of firms in various countries corresponds to observed leverage patterns. To be sure, tangibility is much higher than average for two of the three high-leverage countries at around 0.40 for Indonesia and Thailand (as opposed to 0.35 for the entire sample). But, for both market-to-book assets ratio and log asset size, there is no obvious relation between these and the leverage ratios at the country level: the high leverage jurisdictions report both high and low measures of these firm factors. Firms in Indonesia, Korea and Thailand average significantly higher profitability than firms in other jurisdictions, similar to the grouping of their leverage, but pecking order theory would suggest that more profitable firms would be less leveraged.

In terms of the time-series trends, we also see a very mixed picture. Recall that the high leverage countries of Indonesia, Korea and the Thailand all increased their leverage ahead of the Asian financial crisis in the late 1990s. But profitability was either unchanged or declining for firms in Korea, Indonesia and Thailand over the same period. Similarly, market-to-book ratios, while rather volatile, were generally declining. Only the average asset tangibility metric rose for firms in all countries in the high leverage group.

Did any of the firm variables correspond with the decline in leveraging that occurred after the Asian financial crisis? In both Indonesia and Thailand, asset size declined after the crisis, although asset tangibility declined only for Thailand. Asset tangibility declined, but with a lag for Indonesia and Korea, from around 2000–01. Market-to-book assets ratio remained stable, while profitability declined only for Indonesia.

Descriptive statistics for firm factors

Table IV

	Period	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand	Hong Kong SAR	All Firms
Panel A: Profit									
	Profitability	0.079	0.043	0.041	0.035	0.037	0.055	0.029	0.043
Subperiods	1991-1998	0.096	0.055	0.068	0.051	0.053	0.062	0.063	0.064
	1999-2007	0.073	0.049	0.039	0.021	0.042	0.058	0.025	0.043
	2008-2009	0.081	0.044	0.033	0.029	0.039	0.045	0.025	0.040
	2010-2015	0.074	0.036	0.036	0.046	0.022	0.051	0.026	0.037

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	Period	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand	Hong Kong SAR	All Firms
Panel B: Firm Size									
	Firm size	3.031	4.604	3.927	3.616	5.046	4.120	5.450	4.508
Subperiods	1991-1998	4.578	6.044	4.860	4.591	5.552	4.497	5.511	5.138
	1999-2007	2.781	4.560	3.836	3.287	4.783	3.945	4.904	4.272
	2008-2009	2.535	4.318	3.686	3.289	4.911	3.998	5.568	4.361
	2010-2015	2.657	4.491	3.794	3.620	5.193	4.166	5.894	4.592

	Period	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand	Hong Kong SAR	All Firms
Panel C: Tangibility									
	Tangibility	0.395	0.336	0.379	0.400	0.325	0.400	0.280	0.346
Subperiods	1991-1998	0.405	0.363	0.419	0.482	0.409	0.443	0.414	0.414
	1999-2007	0.400	0.353	0.400	0.446	0.345	0.425	0.307	0.368
	2008-2009	0.393	0.327	0.342	0.342	0.289	0.395	0.243	0.321
	2010-2015	0.385	0.321	0.348	0.317	0.276	0.353	0.234	0.309
Panel D: Market-to-Book Ratio									
	Tangibility	1.377	1.167	1.232	1.413	1.288	1.385	1.423	1.301
Subperiods	1991-1998	1.411	1.047	1.885	1.471	1.519	1.414	1.318	1.439
	1999-2007	1.227	1.128	1.178	1.172	1.360	1.241	1.487	1.266
	2008-2009	1.209	1.052	0.975	1.320	1.077	1.059	1.300	1.110
	2010-2015	1.557	1.250	1.156	1.724	1.171	1.631	1.425	1.351

Note: Mean values of firm characteristics for Asian firms. The sample period is from 1991–2015. The variables are defined in the Appendix.

And finally, the rise in leverage over the recent half decade that we noted for Singapore, the Philippines and Hong Kong SAR over the recent five years or so does not appear to have corresponded with movements in the mean values of any of the explanatory factors other than perhaps asset size (for all three) and market-to-book for the Philippines. This may be related to the fact that the increases in leverage observed for those jurisdictions were principally at the higher percentiles.

4. Firm characteristics and leverage

Table V presents estimates of leverage ratio regressions on firm characteristics. Book leverage is the dependent variable in estimates reported in Columns (1) to (5). Similarly, market leverage is the dependent variable in estimates presented in Columns (6) to (10). We only discuss results for book leverage regressions given how similar the market leverage regression results are.

Capital structure of Asian firms   Table V

	OLS Cls. SE (1)	25th%ile Reg (2)	Median Reg (3)	75th%ile Reg (4)	FE Cls SE (5)	OLS Cls. SE (6)	25th%ile Reg (7)	Median Reg (8)	75th%ile Reg (9)	FE Cls SE (10)
	Book Leverage					Market Leverage				
IndustryMedian Lev$_{t-1}$	0.377*** (15.1)	0.241*** (18.9)	0.464*** (32.0)	0.508*** (33.5)	0.137*** (5.1)	0.392*** (19.3)	0.247*** (24.0)	0.473*** (40.5)	0.528*** (43.0)	0.204*** (9.2)
Profitability$_{t-1}$	−0.469*** (−25.5)	−0.239*** (−20.0)	−0.528*** (−38.6)	−0.775*** (−54.4)	−0.353*** (−22.6)	−0.486*** (−27.8)	−0.261*** (−20.3)	−0.541*** (−37.2)	−0.771*** (−50.3)	−0.385*** (−24.9)
M/B$_{t-1}$	−0.008*** (−4.3)	−0.007*** (−5.2)	−0.008*** (−5.7)	−0.006*** (−3.7)	0.000 (0.2)	−0.068*** (−35.7)	−0.029*** (−20.7)	−0.064*** (−40.8)	−0.081*** (−49.5)	−0.035*** (−19.6)
Size$_{t-1}$	0.029*** (20.2)	0.027*** (43.8)	0.037*** (52.0)	0.031*** (42.7)	0.074*** (26.7)	0.029*** (19.6)	0.022*** (33.0)	0.031*** (41.1)	0.032*** (40.9)	0.084*** (30.0)
Tangibility$_{t-1}$	0.148*** (14.2)	0.174*** (35.4)	0.205*** (36.4)	0.152*** (26.0)	0.117*** (10.4)	0.153*** (14.6)	0.157*** (29.6)	0.190*** (31.8)	0.161*** (25.6)	0.141*** (12.2)
Constant	0.057*** (4.4)	−0.115*** (−18.1)	−0.054*** (−7.5)	0.143*** (18.9)	−0.141*** (−8.8)	0.087*** (7.8)	−0.056*** (−8.6)	0.043*** (5.8)	0.237*** (31.0)	−0.167*** (−10.8)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2-Adjusted/ Pseudo R^2	0.160	0.087	0.105	0.097	0.679	0.256	0.090	0.158	0.178	0.692
Observations	71,842	71,842	71,842	71,842	71,842	71,842	71,842	71,842	71,842	71,842

Note: The table presents estimates of leverage ratio regressions on firm characteristics. The sample comes from the Worldscope files for Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand during the period from 1991 to 2015. Financial firms are excluded. Columns (1) through (5) present estimates of the book leverage estimated as the ratio of debt over debt plus book equity. Columns (6) through (10) present estimates of market leverage, estimated as the ratio of debt over debt plus market equity. The explanatory variables are described in Appendix A. *IndustryMedianLev* is estimated as the median book leverage of all other firms in the same industry in Columns (1) to (5) and as the median market leverage of all other firms in the same industry in Columns (6) to (10). The industry is defined at the level of the four-digit SIC code. All specifications include year fixed effects. The specifications in Columns (5) and (10) additionally include the firm fixed effects. We report t-statistics where the standard errors are clustered at the firm level in parentheses. *** means significance at 1% level.

The other striking fact about these results is how they resemble the results reported in Frank and Goyal (2009) for the United States and those in Öztekin (2015) for countries around the world. Industry median leverage is positively related to leverage, suggesting that firms have high leverage when other firms in the industry have high leverage. This is consistent with all of the work following Frank and Goyal (2009), but it also confirms the findings of Leary and Roberts (2014), who demonstrate the effect of peer firms on leverage policies.

Leverage is negatively related to profitability. The negative relation between leverage and profitability is consistent with firms following a pecking order. However, as shown by Frank and Goyal (2015), the negative relation between leverage and profitability is also consistent with costly adjustment that results in firms making incomplete adjustments. Leverage is negatively related to the market-to-book ratio, which indicates that high-growth firms rely on equity financing. Both firm size and tangibility are positively related to leverage.

To estimate the relation between leverage and firm characteristics at different points in the conditional distribution of leverage, we provide estimates from quantile regressions in Columns (2) to (4), which report what happens at the 25th, 50th, and 75th percentiles, respectively. While the baseline model is robust in both signs and statistical significance, we find that the effect of profitability on leverage is much larger at the 75th percentile than it is at the 25th percentile. Column (5) includes firm fixed effects. Most of our results go through except for the market-to-book ratio, which continues to have the negative coefficient but it is no longer significant.

We also estimate leverage regressions by country and report results for book leverage in Appendix Table A13 and for market leverage in Appendix Table A14. It is reassuring that firm characteristics have similar effects on leverage in every economy that we examine, despite the heterogeneity in leverage trends documented earlier. While the signs and significance levels are similar across countries, we do note that Adjusted R-squared values are smaller for Hong Kong SAR, Malaysia and Singapore. In addition, several of the firm characteristics matter less for leverage in Hong Kong SAR and Singapore than they do for other countries.

It is quite possible that the structure of institutions, including creditor rights, political stability and investor protections, can account for some of the different explanatory power of economy regressions with "reliably important" factors.[8] Both Hong Kong SAR and Singapore have had particularly strong institutions along the above dimensions over the sample period, which could have weakened the relation between leverage and measures of information frictions (Malaysia has also scored relatively highly on some measures as well). For instance, in countries with relatively weak institutions, lenders have limited ability to monitor and therefore lending might be more sensitive to the availability of hard assets (see Giannetti (2003) for related evidence). Overall, the differences in explanatory power we observe in Appendix Tables 13 and 14 are consistent with firm characteristics that help to overcome information asymmetries being less important in corporate financing decisions in countries with strong institutions.

5. Conclusion

We began this paper citing some concerns about the recent growth of corporate debt in the region. The risk of corporate debt is best gauged by taking into account the assets to support it. When corporate debt is measured relative to assets, neither the mean/median nor the upper tails of the distribution are currently in unusually high

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[8]   In another paper, we document the importance of such institutions for the capital structure and financing decisions of firms in Asia and the Pacific more systematically (Goyal and Packer (2017)).

territory on the whole for the more than 7,000 listed firms we examine in the economies of emerging Asia.

The picture is slightly more complicated when we examine leverage trends by jurisdictions. In three of the seven jurisdictions – Hong Kong SAR, the Philippines and Singapore – current book leverage is at or close to all-time highs in the upper tails of the leverage distribution. In Singapore, market leverage is also quite high at the 90th and 95th percentiles. It would be good in future work to check whether the observed increases in leverage in these jurisdictions reflected changes in the industry composition of firms towards more leveraged sectors such as real estate.

In the case of Hong Kong SAR, examination of the underlying data reveals that firms headquartered outside the jurisdiction, particularly in mainland China, have particularly marked increases in leverage. We take this as a strong indication that extending the research to include mainland Chinese firms might result in greater concerns about debt burdens in Asia.

We also find suggestive evidence that the legal environment and quality of institutions have an important influence on the leverage decision: standard firm factors are more weakly related to leverage in jurisdictions with stronger institutions, particularly in the area of creditor rights, political stability and investor protections. We interpret this to mean that firm characteristics such as asset tangibility and size that help to overcome information asymmetries are likely to be less important in the corporate financing decisions in countries with stronger institutions.

Appendix Tables

Common-size balance sheets of Asian firms, 1991–2015

As a fraction of assets   Table A1

	HKG	IDN	KOR	MYS	PHL	SGP	THA	Total
Number of observations	16,740	6,070	20,260	13,136	2,604	10,995	12,044	81,849
Number of firms	1,631	492	1,992	1,071	206	956	962	7,310
Cash and cash equivalents	0.218	0.123	0.149	0.131	0.116	0.178	0.103	0.154
+ Accounts receivable	0.167	0.162	0.206	0.206	0.122	0.191	0.164	0.184
+ Inventory	0.117	0.169	0.122	0.132	0.082	0.136	0.166	0.133
+ Other current assets	0.027	0.030	0.022	0.017	0.027	0.023	0.021	0.023
= Current Assets-Total	0.521	0.480	0.502	0.483	0.343	0.527	0.453	0.492
+ Property plant and equipment-net	0.280	0.395	0.336	0.379	0.400	0.325	0.400	0.346
+ Investment in associated companies	0.046	0.024	0.037	0.035	0.064	0.045	0.039	0.040
+ Other assets	0.149	0.098	0.123	0.100	0.188	0.100	0.104	0.119
= Total assets	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Short-term debt	0.102	0.139	0.165	0.124	0.090	0.112	0.158	0.133
+ Accounts payable	0.091	0.099	0.095	0.083	0.071	0.108	0.091	0.093
+ Other current liabilities	0.103	0.077	0.081	0.081	0.086	0.095	0.071	0.086
= Current Liabilities-Total	0.294	0.314	0.343	0.287	0.248	0.315	0.318	0.312
Long Term Debt	0.083	0.146	0.090	0.084	0.099	0.091	0.118	0.096
+ Other long-term liabilities	0.022	0.039	0.039	0.028	0.046	0.020	0.020	0.029
= Total Liabilities	0.401	0.501	0.473	0.402	0.409	0.429	0.458	0.439
+ Common equity	0.567	0.479	0.508	0.573	0.563	0.544	0.527	0.538
+ Minority interest	0.029	0.019	0.017	0.022	0.023	0.026	0.013	0.021
= Total Liabilities & Shareholders Equity	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Note: The table reports average balance sheet items of firms in various Asian countries. All balance sheet items are expressed as a fraction of assets. The sample period is from 1991 to 2015.

Distribution of corporate leverage

Indonesia

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.272	0.278	0.577	0.609	0.192	0.147	0.455	0.501
1992	0.333	0.310	0.600	0.628	0.244	0.237	0.528	0.581
1993	0.347	0.372	0.569	0.580	0.200	0.192	0.448	0.473
1994	0.347	0.371	0.594	0.609	0.271	0.244	0.551	0.586
1995	0.397	0.434	0.635	0.691	0.364	0.350	0.667	0.735
1996	0.432	0.457	0.670	0.700	0.382	0.418	0.713	0.741
1997	0.583	0.636	0.840	0.868	0.600	0.610	0.920	0.945
1998	0.584	0.652	0.927	0.957	0.617	0.717	0.956	0.970
1999	0.492	0.551	0.872	0.957	0.409	0.413	0.813	0.836
2000	0.445	0.435	0.896	0.912	0.434	0.434	0.861	0.908
2001	0.411	0.410	0.849	0.908	0.442	0.491	0.867	0.931
2002	0.373	0.377	0.784	0.860	0.438	0.459	0.873	0.919
2003	0.390	0.371	0.804	0.868	0.401	0.366	0.834	0.874
2004	0.371	0.374	0.728	0.837	0.358	0.317	0.794	0.837
2005	0.382	0.380	0.746	0.859	0.378	0.350	0.795	0.858
2006	0.350	0.326	0.662	0.754	0.331	0.264	0.763	0.826
2007	0.355	0.372	0.678	0.739	0.293	0.247	0.715	0.779
2008	0.368	0.396	0.710	0.809	0.409	0.423	0.834	0.884
2009	0.341	0.351	0.719	0.773	0.337	0.326	0.732	0.821
2010	0.311	0.311	0.640	0.731	0.263	0.218	0.651	0.758
2011	0.319	0.308	0.630	0.744	0.271	0.219	0.667	0.728
2012	0.314	0.304	0.623	0.735	0.263	0.197	0.660	0.774
2013	0.331	0.321	0.637	0.729	0.299	0.233	0.701	0.819
2014	0.319	0.325	0.634	0.722	0.280	0.212	0.716	0.811
2015	0.324	0.343	0.621	0.697	0.331	0.289	0.767	0.868
All Years	0.368	0.369	0.723	0.823	0.346	0.297	0.776	0.859

Distribution of corporate leverage

Korea

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.669	0.688	0.862	0.894	0.683	0.720	0.845	0.920
1992	0.660	0.672	0.866	0.883	0.662	0.705	0.878	0.921
1993	0.635	0.658	0.834	0.903	0.586	0.609	0.824	0.861
1994	0.617	0.645	0.825	0.882	0.526	0.561	0.802	0.832
1995	0.609	0.638	0.847	0.891	0.600	0.654	0.847	0.896
1996	0.626	0.665	0.865	0.912	0.641	0.722	0.891	0.914
1997	0.673	0.721	0.911	0.951	0.771	0.861	0.971	0.980
1998	0.534	0.558	0.830	0.872	0.649	0.717	0.943	0.967
1999	0.441	0.436	0.757	0.864	0.560	0.590	0.924	0.964
2000	0.412	0.419	0.729	0.826	0.592	0.658	0.935	0.968
2001	0.392	0.402	0.742	0.825	0.500	0.535	0.883	0.931
2002	0.361	0.364	0.694	0.799	0.474	0.511	0.871	0.910
2003	0.336	0.325	0.673	0.779	0.425	0.445	0.822	0.872
2004	0.310	0.298	0.628	0.713	0.396	0.397	0.796	0.856
2005	0.291	0.274	0.619	0.695	0.273	0.224	0.631	0.736
2006	0.289	0.272	0.611	0.697	0.282	0.238	0.656	0.732
2007	0.289	0.263	0.626	0.708	0.263	0.209	0.627	0.711
2008	0.334	0.328	0.691	0.758	0.405	0.412	0.800	0.864
2009	0.314	0.299	0.643	0.720	0.326	0.295	0.712	0.792
2010	0.308	0.299	0.633	0.709	0.313	0.284	0.671	0.763
2011	0.317	0.311	0.640	0.726	0.339	0.306	0.724	0.799
2012	0.315	0.303	0.646	0.731	0.328	0.290	0.717	0.797
2013	0.312	0.288	0.648	0.727	0.315	0.273	0.693	0.781
2014	0.298	0.273	0.618	0.709	0.294	0.238	0.682	0.758
2015	0.286	0.262	0.607	0.702	0.252	0.182	0.619	0.715
All Years	0.339	0.328	0.688	0.775	0.363	0.329	0.777	0.858

Distribution of corporate leverage

Malaysia

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.196	0.171	0.420	0.593	0.145	0.089	0.380	0.451
1992	0.197	0.155	0.453	0.501	0.125	0.073	0.338	0.414
1993	0.213	0.167	0.504	0.527	0.091	0.042	0.241	0.288
1994	0.249	0.224	0.544	0.601	0.129	0.079	0.318	0.399
1995	0.292	0.270	0.628	0.686	0.159	0.115	0.385	0.452
1996	0.315	0.339	0.630	0.709	0.170	0.127	0.394	0.505
1997	0.363	0.366	0.724	0.845	0.398	0.385	0.796	0.855
1998	0.365	0.360	0.756	0.864	0.374	0.368	0.765	0.833
1999	0.319	0.285	0.684	0.798	0.279	0.219	0.654	0.771
2000	0.299	0.265	0.642	0.762	0.319	0.262	0.717	0.801
2001	0.278	0.229	0.622	0.737	0.293	0.236	0.672	0.755
2002	0.290	0.256	0.640	0.749	0.326	0.293	0.732	0.796
2003	0.286	0.241	0.635	0.745	0.274	0.230	0.642	0.709
2004	0.285	0.255	0.619	0.737	0.301	0.240	0.682	0.757
2005	0.288	0.251	0.617	0.716	0.336	0.280	0.744	0.817
2006	0.285	0.263	0.601	0.690	0.306	0.267	0.679	0.765
2007	0.274	0.250	0.589	0.667	0.297	0.236	0.690	0.760
2008	0.280	0.258	0.589	0.683	0.376	0.362	0.769	0.826
2009	0.260	0.229	0.556	0.710	0.311	0.264	0.696	0.764
2010	0.246	0.222	0.539	0.649	0.284	0.240	0.640	0.745
2011	0.233	0.202	0.515	0.616	0.276	0.209	0.646	0.737
2012	0.234	0.201	0.517	0.615	0.276	0.227	0.657	0.738
2013	0.228	0.188	0.508	0.595	0.241	0.183	0.605	0.682
2014	0.225	0.189	0.505	0.596	0.244	0.188	0.595	0.703
2015	0.238	0.204	0.522	0.630	0.253	0.187	0.596	0.714
All Years	0.268	0.234	0.589	0.693	0.286	0.225	0.675	0.764

Distribution of corporate leverage

Philippines

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.269	0.237	0.578	0.604	0.219	0.276	0.363	0.730
1992	0.260	0.219	0.515	0.688	0.196	0.090	0.472	0.767
1993	0.301	0.280	0.510	0.682	0.169	0.096	0.447	0.586
1994	0.250	0.193	0.544	0.651	0.183	0.132	0.447	0.578
1995	0.273	0.262	0.571	0.642	0.192	0.185	0.384	0.494
1996	0.313	0.315	0.614	0.684	0.249	0.211	0.591	0.747
1997	0.381	0.342	0.718	0.776	0.435	0.424	0.871	0.911
1998	0.329	0.315	0.642	0.728	0.409	0.374	0.768	0.914
1999	0.317	0.281	0.703	0.775	0.364	0.334	0.829	0.888
2000	0.301	0.295	0.654	0.785	0.396	0.396	0.897	0.933
2001	0.310	0.297	0.620	0.773	0.431	0.418	0.897	0.950
2002	0.309	0.240	0.759	0.911	0.428	0.367	0.913	0.956
2003	0.267	0.191	0.616	0.788	0.346	0.255	0.858	0.885
2004	0.266	0.197	0.650	0.747	0.317	0.254	0.849	0.897
2005	0.268	0.219	0.655	0.833	0.293	0.248	0.772	0.840
2006	0.236	0.199	0.555	0.643	0.228	0.156	0.590	0.722
2007	0.208	0.145	0.471	0.634	0.169	0.090	0.499	0.605
2008	0.223	0.166	0.567	0.647	0.267	0.175	0.683	0.796
2009	0.191	0.120	0.503	0.623	0.190	0.089	0.532	0.729
2010	0.199	0.105	0.527	0.681	0.159	0.060	0.461	0.579
2011	0.188	0.087	0.521	0.618	0.155	0.049	0.447	0.621
2012	0.205	0.112	0.573	0.688	0.154	0.044	0.489	0.614
2013	0.210	0.142	0.568	0.639	0.177	0.069	0.560	0.620
2014	0.227	0.148	0.572	0.744	0.180	0.083	0.502	0.674
2015	0.239	0.137	0.629	0.753	0.200	0.098	0.580	0.724
All Years	0.253	0.198	0.605	0.707	0.260	0.169	0.724	0.849

Distribution of corporate leverage

Thailand

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.357	0.328	0.676	0.684	0.224	0.182	0.500	0.592
1992	0.389	0.402	0.675	0.722	0.237	0.226	0.453	0.573
1993	0.414	0.417	0.685	0.747	0.247	0.239	0.484	0.572
1994	0.419	0.443	0.668	0.731	0.291	0.271	0.547	0.631
1995	0.455	0.482	0.693	0.735	0.380	0.374	0.659	0.735
1996	0.479	0.520	0.711	0.752	0.479	0.514	0.795	0.845
1997	0.565	0.622	0.881	0.955	0.626	0.694	0.948	0.961
1998	0.493	0.532	0.901	0.949	0.561	0.649	0.936	0.946
1999	0.444	0.477	0.853	0.936	0.459	0.487	0.877	0.911
2000	0.419	0.436	0.847	0.927	0.486	0.542	0.904	0.934
2001	0.395	0.386	0.791	0.911	0.425	0.441	0.834	0.879
2002	0.352	0.329	0.727	0.810	0.350	0.318	0.762	0.828
2003	0.334	0.325	0.676	0.740	0.239	0.195	0.597	0.719
2004	0.308	0.289	0.629	0.694	0.263	0.224	0.580	0.683
2005	0.304	0.295	0.621	0.672	0.282	0.253	0.631	0.716
2006	0.300	0.294	0.611	0.680	0.280	0.247	0.615	0.747
2007	0.295	0.275	0.629	0.714	0.273	0.224	0.622	0.753
2008	0.306	0.286	0.653	0.727	0.361	0.332	0.771	0.839
2009	0.285	0.238	0.639	0.704	0.281	0.239	0.665	0.732
2010	0.283	0.255	0.622	0.706	0.239	0.195	0.568	0.653
2011	0.298	0.291	0.634	0.710	0.260	0.211	0.616	0.687
2012	0.291	0.282	0.624	0.717	0.216	0.146	0.544	0.626
2013	0.287	0.261	0.611	0.701	0.227	0.168	0.557	0.653
2014	0.297	0.290	0.600	0.692	0.204	0.152	0.491	0.595
2015	0.290	0.282	0.612	0.689	0.226	0.161	0.558	0.627
All Years	0.339	0.336	0.687	0.773	0.307	0.256	0.711	0.821

Distribution of corporate leverage

Hong Kong SAR

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.228	0.184	0.450	0.681	0.211	0.168	0.478	0.607
1992	0.223	0.188	0.479	0.602	0.205	0.159	0.453	0.566
1993	0.233	0.221	0.440	0.559	0.190	0.162	0.402	0.492
1994	0.277	0.276	0.544	0.574	0.268	0.248	0.573	0.617
1995	0.304	0.294	0.565	0.641	0.306	0.284	0.635	0.697
1996	0.295	0.281	0.566	0.678	0.266	0.209	0.597	0.667
1997	0.288	0.268	0.548	0.653	0.311	0.283	0.668	0.754
1998	0.286	0.264	0.576	0.648	0.373	0.344	0.751	0.849
1999	0.256	0.244	0.505	0.585	0.285	0.220	0.666	0.736
2000	0.240	0.203	0.532	0.634	0.285	0.226	0.698	0.772
2001	0.229	0.199	0.507	0.596	0.255	0.171	0.650	0.732
2002	0.231	0.192	0.517	0.605	0.274	0.196	0.711	0.769
2003	0.242	0.198	0.535	0.610	0.226	0.161	0.587	0.693
2004	0.243	0.215	0.531	0.605	0.229	0.173	0.575	0.668
2005	0.244	0.211	0.522	0.641	0.235	0.165	0.587	0.694
2006	0.246	0.218	0.543	0.646	0.210	0.140	0.564	0.673
2007	0.232	0.194	0.532	0.620	0.177	0.113	0.460	0.586
2008	0.244	0.216	0.534	0.637	0.303	0.247	0.725	0.804
2009	0.227	0.183	0.522	0.607	0.197	0.123	0.511	0.603
2010	0.231	0.196	0.522	0.606	0.201	0.133	0.533	0.621
2011	0.249	0.214	0.550	0.626	0.271	0.197	0.661	0.733
2012	0.261	0.227	0.573	0.664	0.268	0.209	0.646	0.732
2013	0.266	0.229	0.590	0.675	0.264	0.202	0.662	0.736
2014	0.278	0.236	0.606	0.691	0.263	0.193	0.643	0.750
2015	0.295	0.268	0.639	0.736	0.270	0.206	0.665	0.762
All Years	0.253	0.220	0.555	0.646	0.251	0.185	0.628	0.724

Distribution of corporate leverage

Hong Kong SAR—Local corporates

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.234	0.190	0.474	0.693	0.224	0.178	0.516	0.615
1992	0.228	0.189	0.476	0.648	0.218	0.169	0.466	0.619
1993	0.236	0.220	0.449	0.563	0.203	0.167	0.421	0.510
1994	0.285	0.286	0.546	0.581	0.286	0.273	0.581	0.619
1995	0.309	0.300	0.590	0.649	0.316	0.306	0.639	0.697
1996	0.301	0.284	0.577	0.694	0.279	0.235	0.597	0.669
1997	0.291	0.271	0.548	0.674	0.330	0.312	0.683	0.760
1998	0.285	0.257	0.585	0.648	0.391	0.366	0.761	0.856
1999	0.251	0.227	0.504	0.582	0.290	0.238	0.666	0.732
2000	0.237	0.200	0.510	0.603	0.293	0.230	0.700	0.774
2001	0.225	0.194	0.505	0.586	0.262	0.176	0.661	0.740
2002	0.227	0.189	0.514	0.593	0.285	0.206	0.717	0.770
2003	0.240	0.195	0.534	0.613	0.238	0.169	0.614	0.705
2004	0.241	0.211	0.520	0.604	0.237	0.173	0.610	0.676
2005	0.243	0.208	0.522	0.641	0.244	0.174	0.611	0.698
2006	0.240	0.202	0.543	0.657	0.220	0.146	0.589	0.686
2007	0.226	0.187	0.513	0.620	0.196	0.129	0.505	0.614
2008	0.237	0.199	0.526	0.637	0.315	0.256	0.745	0.824
2009	0.213	0.164	0.500	0.594	0.205	0.132	0.532	0.617
2010	0.218	0.178	0.505	0.594	0.209	0.143	0.546	0.628
2011	0.234	0.199	0.537	0.615	0.271	0.198	0.667	0.737
2012	0.244	0.208	0.543	0.642	0.263	0.209	0.639	0.724
2013	0.240	0.189	0.557	0.636	0.239	0.173	0.611	0.707
2014	0.249	0.200	0.571	0.665	0.233	0.158	0.597	0.711
2015	0.261	0.213	0.593	0.717	0.235	0.158	0.620	0.728
All Years	0.242	0.205	0.537	0.635	0.253	0.188	0.629	0.722

Distribution of corporate leverage

Hong Kong SAR—Non-local corporates

Year	Book Leverage				Market Leverage			
	Mean	Median	90th %ile	95th % ile	Mean	Median	90th %ile	95th % ile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1991	0.179	0.120	0.401	0.407	0.106	0.058	0.316	0.368
1992	0.187	0.124	0.479	0.486	0.092	0.029	0.182	0.415
1993	0.212	0.221	0.323	0.440	0.098	0.071	0.220	0.342
1994	0.207	0.182	0.440	0.449	0.123	0.096	0.284	0.348
1995	0.261	0.233	0.482	0.538	0.221	0.174	0.456	0.606
1996	0.256	0.263	0.451	0.545	0.170	0.122	0.378	0.618
1997	0.267	0.244	0.508	0.574	0.190	0.165	0.444	0.486
1998	0.287	0.265	0.565	0.696	0.273	0.209	0.657	0.798
1999	0.288	0.304	0.561	0.689	0.258	0.171	0.637	0.752
2000	0.261	0.217	0.551	0.644	0.240	0.129	0.633	0.741
2001	0.258	0.222	0.537	0.635	0.209	0.160	0.527	0.650
2002	0.251	0.194	0.527	0.643	0.207	0.179	0.484	0.558
2003	0.250	0.214	0.542	0.593	0.161	0.125	0.365	0.478
2004	0.251	0.234	0.544	0.640	0.191	0.173	0.487	0.531
2005	0.246	0.225	0.497	0.634	0.195	0.132	0.447	0.570
2006	0.265	0.244	0.526	0.608	0.176	0.117	0.433	0.542
2007	0.248	0.242	0.540	0.626	0.128	0.072	0.336	0.414
2008	0.263	0.247	0.544	0.632	0.275	0.221	0.645	0.750
2009	0.259	0.236	0.562	0.630	0.178	0.110	0.449	0.547
2010	0.256	0.231	0.557	0.621	0.185	0.122	0.487	0.569
2011	0.277	0.255	0.576	0.645	0.273	0.197	0.656	0.731
2012	0.293	0.267	0.605	0.673	0.277	0.209	0.661	0.747
2013	0.318	0.293	0.639	0.706	0.310	0.254	0.701	0.773
2014	0.339	0.333	0.656	0.722	0.326	0.286	0.733	0.799
2015	0.353	0.351	0.676	0.777	0.328	0.267	0.743	0.785
All Years	0.285	0.262	0.592	0.670	0.245	0.176	0.623	0.726

Distribution of corporate leverage

Singapore

Year	Book Leverage				Market Leverage			
	Mean (1)	Median (2)	90th %ile (3)	95th % ile (4)	Mean (5)	Median (6)	90th %ile (7)	95th % ile (8)
1991	0.243	0.235	0.519	0.620	0.192	0.141	0.455	0.557
1992	0.255	0.237	0.522	0.608	0.198	0.155	0.425	0.540
1993	0.264	0.254	0.580	0.629	0.156	0.117	0.351	0.478
1994	0.249	0.220	0.518	0.588	0.169	0.122	0.390	0.501
1995	0.268	0.236	0.552	0.591	0.191	0.152	0.442	0.508
1996	0.300	0.297	0.559	0.616	0.225	0.221	0.478	0.544
1997	0.327	0.337	0.610	0.659	0.359	0.353	0.723	0.789
1998	0.352	0.357	0.672	0.775	0.378	0.354	0.764	0.820
1999	0.313	0.287	0.638	0.699	0.278	0.219	0.627	0.701
2000	0.293	0.282	0.615	0.674	0.307	0.279	0.686	0.764
2001	0.297	0.276	0.604	0.695	0.320	0.288	0.712	0.768
2002	0.291	0.278	0.596	0.681	0.328	0.297	0.700	0.772
2003	0.271	0.260	0.532	0.630	0.247	0.195	0.565	0.671
2004	0.274	0.257	0.533	0.610	0.262	0.216	0.593	0.698
2005	0.263	0.229	0.552	0.647	0.259	0.195	0.603	0.715
2006	0.267	0.230	0.548	0.627	0.221	0.165	0.533	0.614
2007	0.251	0.228	0.527	0.611	0.205	0.149	0.483	0.578
2008	0.257	0.229	0.544	0.635	0.330	0.280	0.733	0.819
2009	0.241	0.205	0.515	0.632	0.247	0.199	0.570	0.687
2010	0.237	0.207	0.510	0.606	0.232	0.185	0.541	0.631
2011	0.256	0.234	0.534	0.639	0.295	0.243	0.657	0.749
2012	0.270	0.258	0.561	0.645	0.285	0.252	0.614	0.718
2013	0.279	0.242	0.590	0.655	0.286	0.232	0.636	0.727
2014	0.283	0.256	0.594	0.692	0.306	0.268	0.693	0.789
2015	0.285	0.251	0.635	0.714	0.328	0.281	0.736	0.855
All Years	0.272	0.249	0.566	0.651	0.271	0.219	0.630	0.728

Distribution of corporate leverage

Singapore—Local corporates

Year	Book leverage				Market leverage			
	Mean	Median	90th %ile	95th %ile	Mean	Median	90th %ile	95th %ile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1991	0.223	0.200	0.468	0.561	0.181	0.129	0.441	0.547
1992	0.240	0.215	0.483	0.541	0.204	0.167	0.423	0.609
1993	0.261	0.251	0.551	0.620	0.165	0.124	0.351	0.475
1994	0.235	0.217	0.504	0.548	0.162	0.113	0.366	0.477
1995	0.260	0.226	0.545	0.582	0.181	0.141	0.409	0.470
1996	0.292	0.286	0.555	0.592	0.224	0.225	0.478	0.544
1997	0.322	0.326	0.584	0.625	0.343	0.328	0.691	0.780
1998	0.342	0.346	0.639	0.771	0.361	0.335	0.738	0.808
1999	0.294	0.274	0.574	0.669	0.249	0.196	0.571	0.690
2000	0.286	0.279	0.572	0.660	0.289	0.269	0.620	0.695
2001	0.293	0.275	0.593	0.693	0.310	0.288	0.670	0.734
2002	0.283	0.262	0.584	0.655	0.313	0.280	0.656	0.730
2003	0.267	0.259	0.526	0.605	0.238	0.188	0.544	0.613
2004	0.268	0.248	0.529	0.598	0.254	0.199	0.573	0.689
2005	0.261	0.223	0.544	0.647	0.253	0.190	0.584	0.680
2006	0.264	0.220	0.548	0.628	0.217	0.165	0.515	0.606
2007	0.248	0.226	0.517	0.606	0.199	0.149	0.467	0.567
2008	0.257	0.229	0.534	0.623	0.325	0.265	0.720	0.793
2009	0.241	0.216	0.496	0.625	0.242	0.199	0.561	0.651
2010	0.238	0.209	0.497	0.595	0.231	0.185	0.530	0.597
2011	0.259	0.235	0.533	0.644	0.293	0.239	0.641	0.742
2012	0.267	0.252	0.558	0.644	0.271	0.236	0.601	0.667
2013	0.269	0.222	0.587	0.642	0.269	0.215	0.616	0.683
2014	0.272	0.253	0.589	0.661	0.291	0.256	0.662	0.741
2015	0.276	0.225	0.630	0.708	0.317	0.281	0.719	0.790
All Years	0.267	0.242	0.554	0.638	0.263	0.212	0.608	0.699

Distribution of corporate leverage

Singapore—Non-local corporates

Table A12

Year	Book leverage				Market leverage			
	Mean	Median	90th %ile	95th %ile	Mean	Median	90th %ile	95th %ile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1991	0.268	0.272	0.593	0.670	0.208	0.179	0.455	0.617
1992	0.276	0.249	0.599	0.716	0.190	0.142	0.427	0.534
1993	0.269	0.255	0.588	0.665	0.145	0.103	0.447	0.478
1994	0.275	0.289	0.583	0.678	0.181	0.144	0.501	0.551
1995	0.284	0.311	0.562	0.653	0.213	0.180	0.490	0.590
1996	0.316	0.371	0.589	0.616	0.227	0.212	0.471	0.514
1997	0.337	0.352	0.616	0.719	0.394	0.397	0.741	0.811
1998	0.374	0.368	0.702	0.779	0.414	0.429	0.774	0.838
1999	0.354	0.300	0.691	0.760	0.341	0.322	0.701	0.798
2000	0.316	0.300	0.652	0.729	0.364	0.321	0.784	0.811
2001	0.311	0.294	0.637	0.796	0.356	0.300	0.762	0.784
2002	0.318	0.306	0.611	0.708	0.380	0.383	0.755	0.827
2003	0.287	0.275	0.587	0.634	0.282	0.236	0.665	0.698
2004	0.296	0.308	0.549	0.653	0.295	0.239	0.656	0.772
2005	0.271	0.257	0.562	0.662	0.278	0.228	0.671	0.782
2006	0.277	0.311	0.565	0.621	0.235	0.188	0.561	0.646
2007	0.258	0.243	0.545	0.611	0.220	0.151	0.540	0.639
2008	0.256	0.230	0.571	0.660	0.344	0.296	0.774	0.838
2009	0.240	0.186	0.533	0.653	0.259	0.196	0.684	0.777
2010	0.233	0.185	0.546	0.648	0.235	0.188	0.561	0.746
2011	0.248	0.225	0.552	0.615	0.301	0.260	0.673	0.759
2012	0.279	0.265	0.562	0.652	0.324	0.296	0.693	0.813
2013	0.308	0.300	0.616	0.729	0.335	0.292	0.743	0.835
2014	0.319	0.273	0.641	0.890	0.357	0.302	0.823	0.860
2015	0.321	0.288	0.684	0.761	0.375	0.272	0.886	0.928
All Years	0.285	0.274	0.596	0.678	0.293	0.237	0.699	0.787

Book leverage regressions by country

Table A13

	HKG (1)	IDN (2)	KOR (3)	MYS (4)	PHL (5)	SGP (6)	THA (7)
Industry Median Lev $_{t-1}$	0.367***	0.337***	0.321***	0.150**	0.260**	0.195***	0.324***
	(8.1)	(3.6)	(6.2)	(2.5)	(2.4)	(3.5)	(4.6)
Profitability $_{t-1}$	−0.332***	−0.697***	−0.884***	−0.707***	−0.322***	−0.363***	−0.711***
	(−11.0)	(−10.1)	(−24.6)	(−15.1)	(−3.6)	(−8.5)	(−13.0)
M/B $_{t-1}$	−0.007**	−0.004	0.012**	0.002	0.002	−0.007	0.005
	(−2.4)	(−0.6)	(2.4)	(0.3)	(0.3)	(−1.3)	(0.8)
Size $_{t-1}$	0.031***	0.044***	0.042***	0.045***	0.079***	0.027***	0.053***
	(11.2)	(8.7)	(13.3)	(11.0)	(13.8)	(7.5)	(13.3)
Tangibility $_{t-1}$	0.097***	0.140***	0.246***	0.049*	0.118***	0.093***	0.079***
	(4.9)	(4.1)	(11.3)	(1.9)	(2.7)	(3.6)	(3.0)
Constant	−0.045*	0.079*	0.262***	−0.016	−0.198***	0.056*	0.079**
	(−1.8)	(1.8)	(9.5)	(−0.5)	(−4.0)	(1.9)	(2.1)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2-Adjusted	0.155	0.230	0.316	0.162	0.378	0.111	0.246
Observations	14,387	5,337	17,783	11,724	2,230	9,672	10,709

Note: ***, ** and * mean significance at the 1%, 5% and 10%, respectively.

Market leverage regressions by country

Table A14

	HKG (1)	IDN (2)	KOR (3)	MYS (4)	PHL (5)	SGP (6)	THA (7)
Industry Median Lev $_{t-1}$	0.393***	0.363***	0.442***	0.217***	0.367***	0.241***	0.321***
	(10.1)	(5.1)	(10.3)	(4.4)	(3.9)	(5.0)	(6.3)
Profitability $_{t-1}$	−0.316***	−0.729***	−0.830***	−0.764***	−0.503***	−0.385***	−0.678***
	(−11.6)	(−11.1)	(−22.8)	(−15.3)	(−5.7)	(−9.4)	(−14.1)
M/B $_{t-1}$	−0.061***	−0.069***	−0.062***	−0.052***	−0.043***	−0.060***	−0.055***
	(−20.4)	(−10.4)	(−13.5)	(−9.5)	(−4.7)	(−10.5)	(−10.4)
Size $_{t-1}$	0.029***	0.040***	0.044***	0.041***	0.068***	0.027***	0.041***
	(10.6)	(7.6)	(13.1)	(9.2)	(9.8)	(6.9)	(10.9)
Tangibility $_{t-1}$	0.096***	0.155***	0.265***	0.069**	0.126***	0.132***	0.071***
	(4.6)	(4.4)	(11.8)	(2.6)	(2.7)	(4.9)	(2.8)
Constant	0.050**	0.135***	0.301***	−0.017	−0.158***	0.078***	0.139***
	(2.1)	(3.5)	(10.9)	(−0.6)	(−3.8)	(3.0)	(4.6)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2-Adjusted	0.258	0.339	0.415	0.231	0.394	0.217	0.332
Observations	14,387	5,337	17,783	11,724	2,230	9,672	10,709

Note: *** and ** mean significance at the 1% and 5%, respectively.

Appendix A. Variable definitions

Leverage measures

Book Leverage is the ratio of total debt (debt in current liabilities + long-term debt) to total debt plus book equity.

Market Leverage is the ratio of total debt (debt in current liabilities + long-term debt) to total debt plus market value of equity (stock price × shares outstanding).

Profitability

Profitability – operating income before depreciation (Profit) is the ratio of operating income before depreciation, to assets.

Firm size

Log of Assets (Assets) is the log of assets (in US dollars) deflated to 2010 dollars using the GDP deflator.

Growth opportunities

Market-to-Book ratio (Mktbk) is the ratio of market value of assets to book value of assets. Market value of assets is obtained as the sum of the assets – book value of equity + market value of equity (stock price × shares outstanding).

Industry

Median industry leverage (IndustLev) is the median of total debt to book (market) capitalisation by country, SIC code and year. Industry is defined at the four-digit SIC code level in the main results.

Nature of assets

Tangibility (Tang) is the ratio of net property, plant and equipment to assets.

Macroeconomic variables

Log(GDP per capita): Natural log of the average GDP per capita in US dollars.

General government gross debt as a percentage of GDP obtained from IMF World Economic Outlook (WEO).

Stock market capitalisation as a percentage of GDP also obtained from IMF WEO.

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Comments on "Corporate leverage in emerging Asia"

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1. Findings and contributions of the paper

This paper empirically examines the determinants of capital structure of Asian firms and investigates whether those determinants change over time. Understanding the determinants of capital structure is of paramount importance to corporate finance and policymakers. An efficient capital market that provides proper funding to productive firms is critical to economic growth and social welfare. Whether such capital should be equity or debt will depend on the particular macroeconomic and market conditions. Therefore, I applaud the authors for doing this useful research.

Goyal and Packer use a large panel of 77,342 firm-year observations to answer those research questions. The data set covers seven major Asian economies over a 14-year period (1991–2014). It has a rich composition of 7,198 firms from various industries. Hence, the sample is representative and the findings will have broad implications beyond any specific industry, region or time.

This study provides many interesting findings. The main result is that leverage has been stable over the sample period for the examined Asian firms. While this result may not sound alarming at first glance, it has a profound implication that Asian capital markets have not improved during this relatively long period including the Asian financial crisis. Given the emerging market nature of Asia, this is a novel and surprising finding worth further understanding. On the other hand, the authors also find that legal and institutional factors are important determinants of leverage of Asian firms. Furthermore, global liquidity conditions can also matter to the capital structure of Asian firms.

There is a lack of study on Asian firms' financial policies and this study by Goyal and Packer makes a substantial contribution to the literature. Moreover, their consideration of factors from outside Asia such as global liquidity conditions is novel. I find the results from the paper sensible and useful. For example, they find that legal and institutional factors are important determinants of corporate capital structure in Asia. Given that those factors are persistent and slow-moving, corporate leverage associated with those legal and institutional factors will also be stable.

While it is comforting to see all the sensible results, a little more focus on the main message of the study would be helpful. Moreover, the empirical design mostly follows that of US studies. I wonder if there is any role for an Asia-specific factor. Furthermore, I suggest that the authors discuss the economic significance of the various estimates in a unified framework. I provide detailed comments below.

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2. Understanding the results and potential extensions for the future

2.1. Sample selection

This study uses a comprehensive sample from seven Asian economies: Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. The three biggest economies in the region – China, Japan and India – are not included in the analysis. Given the size of those economies, it would be justifiable to study them in separate projects. However, it is worth discussing whether the findings from this study will be applicable to other Asian economies.

China has experienced fast growth in corporate debt since 2008, when the government implemented the "four trillion" stimulus package. Moreover, the growth is likely to be concentrated on state-owned enterprises (SOEs). Now Chinese firms have much higher leverage than they used to have. Chinese firms also heavily depend on banks for financing. All these features would make it worthwhile to study Chinese firms, probably in a standalone paper with reference to firms from other countries, with an analysis of time variations within firms. A similar point can be made for India as the level of corporate leverage has risen substantially in the last few years.

Another country of interest is Vietnam. Many say that Vietnam is China 30 years ago as it is implementing economic reforms and taking over many manufacturing jobs from China. Moreover, given its French colonial background, Vietnam can enrich the legal and institutional setting of the analysis. Therefore, if possible, extending the sample to include Vietnam would strengthen the paper.

There are also some sizeable economies from the Middle East such as Saudi Arabia and United Arab Emirates (UAE) that could enrich the diversity of the sample as there is much Islamic finance. The UAE is also becoming a more interesting economy during its economic transition. Kazakhstan, among some other central Asian countries, is another example of a transition economy worthy of more attention in the future. Having said that, the sample used for current study is appropriate and the results based on the selected firms are reliable.

2.2. Stable capital structure

One of the paper's main results is that the capital structure for Asian firms in the sample is stable over the examined period. This finding at first may sound sensible and similar to some of the findings from the United States (eg Lemmon et al (2008)). However, for firms from the developing economies in the sample, such stability in capital structure is somewhat surprising. If Asian firms on average are financially constrained, as many believe, and the capital markets are improving, then we might expect changes over time and possible movement towards a more optimal capital structure for Asian firms. For example, if public bond markets become more liquid, firms might be expected to have higher leverage at the end of the sample than at the beginning as firms gain access to bond financing. Therefore, the stable capital structure may suggest that Asian capital markets have not improved much over the last two decades.

Given that the sample includes only publicly listed firms, one may wonder about the results for private firms if data are available (eg from Capital IQ). However, if

capital markets for publicly listed firms have not improved, it is hard to imagine that the capital structure for private firms would have improved. Nevertheless, it is worth comparing small firms with large firms and seeing if there is any heterogeneity among their changes in leverage over time.

Observations from the stock market listing suggest that Asian capital markets may have changed substantially during the 1991–2014 sample period and there is much heterogeneity across countries. For example, the number of publicly listed firms for Malaysia increased from 318 to 895, a near threefold growth. Similar increases occurred in other Asian economies. Most notably, Hong Kong SAR had 333 publicly listed firms in 1991, but 1,661 in 2014, driven by the dramatic increase in the number of firms from Mainland China. In contrast, the United States actually experienced a decrease in public listing during the same period, with 6,513 publicly listed firms in 1991 and 4,369 public listed firms in 2014. This listing gap is documented by Doidge, Karolyi and Stulz (2013 and 2016).

Another implication of the stable capital structure can be that the adjustment costs are so high that firms can barely change their leverage. In this case, leverage change will be mostly driven by stock price movements. This can be the case even for US firms, as documented by Welch (2004). Therefore, it will be interesting to estimate the adjustment speed for Asian firms. If one believes that adjustment costs are higher for Asian firms than US firms, then we may observe an even more stable capital structure for Asian firms than for US firms.

Overall, I find the stability in Asian firms' capital structure over a long time period surprising. I would suggest more scrutiny and discussion to better understand this result. It could well be the average result from the large panel. In this case, it will be worthwhile to examine the disaggregated results, as there might be substantial heterogeneity across firms, while keeping the average unchanged. For example, industry is among the most important determinants of corporate leverage. Even for the same constant industry-level leverage, there can be much variation across firms and over time within an industry.

2.3. Leverage and other corporate policies

The paper provides many results beyond corporate capital structure, such as cash flows and investment. However, those corporate policies are examined separately. A series of studies by Bolton et al (2011, 2013 and 2015) argue that we should understand corporate policies in a unified framework. Indeed, corporate executives most likely consider various policies jointly to maximise firm value. One way to enrich the analysis is to use simultaneous equations to jointly analyse leverage, cash holdings and, maybe, investments.

Structural estimation is also suitable for this type of joint analysis. The advantage of structural models is that we can have normative implications such as whether Asian firms have an optimal capital structure. Whited and Zhao (2016) use structural models to measure inefficiencies in the cross-sectional distribution of debt and equity for both US and Chinese firms. They conclude that Chinese firms misallocate capital substantially more than US firms do. However, given the large panel and cross-country setting, structural estimation is probably not a feasible direction for the current study.

2.4. New trends and policy implications

There are some interesting new phenomena for the corporate policies of US firms. One may examine whether the same things are happening for Asian firms. One example is "leveraged repurchase" through which firms issue debt to buy back their stocks (see, for example, Farre-Mensa et al (2015)). It is possible that this is a US-specific phenomenon due to the country's quantitative easing since the 2008 financial crisis. But, it may also have spillover effects to Asia.

Another interesting point is the reliably important factors for the capital structure of Asian firms, along the lines of Frank and Goyal (2009) and Öztekin (2015). While many of the capital structure theories should be universally applicable, one may expect some different results for Asia firms given the dominance of family firms and SOEs.

Given the many results, some of which are novel and surprising as discussed above, it is useful to discuss the policy implications. If policymakers and regulators in Asia want to improve capital allocative efficiency, they may want an implementable prescription based on the results from this paper. This is especially useful given the influence of the BIS and its research.

3. Summary

Goyal and Packer have done excellent work in analysing the capital structure of Asian firms over a long time period. They have conducted a thorough analysis and provided interesting results. Given that Asian economies now contribute more than half of global economic growth, it is important to understand the financing of Asian firms. I find many of the results sensible, such as the effects of legal and institutional factors on corporate leverage. I am somewhat surprised by the stable leverage of Asian firms over the long time period, especially considering that how much has happened in those developing economies during that period. I would encourage the authors and other researchers to further examine those issues, probably bringing in China and India, as this duo will be the dominant players in the region and the entire world for many years to come.

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Foreign banks and credit conditions in EMEs

Torsten Ehlers and Patrick McGuire[1]

Abstract

A large literature assesses the benefits that foreign banks bring to emerging market economies (EMEs), drawing evidence from datasets that track the ownership of banks located in a particular country. Similarly, previous work has demonstrated that cross-border credit – both direct cross-border credit and indirect cross-border credit that is routed via resident banks – fuelled the boom-bust credit cycle in EMEs around the 2007–09 financial crisis. This paper explores this credit cycle from a different perspective, using a dataset that simultaneously delineates between bank ownership and the location of the borrowers. This helps to isolate the share of total bank credit – which includes domestic credit and cross-border credit to non-banks – that is provided by foreign banks, a measure that is not possible to construct using the standard ownership datasets. The results suggest that cross-border credit did exacerbate the credit cycle, but that foreign banks did not necessarily have a destabilising effect since their local operations (ie local lending funded in the local currency) were a source of stability. In short, what matters is the type of bank claim rather than bank ownership.

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1. Introduction

The experience of the 2007–09 financial crisis put a spotlight on the destabilising effects of international credit flows. Rapid growth in international credit, primarily cross-border credit, contributed greatly to a rise in credit-to-GDP ratios in those countries that were hit hardest once the crisis was under way.

International bank credit, broadly defined, is credit that is backed by liabilities outside the borrower country. Such credit can be extended directly cross-border, or can be booked by banks in the borrower country and backed by cross-border liabilities. Either way, the support for this credit comes from something other than the domestic deposit base. Previous work, most notably Borio et al (2011), Avdjiev et al (2012) and CGFS (2012), dissects the dimensions of international bank credit and shows how it contributed to credit booms in the years before the global financial crisis. As noted in Avdjiev et al (2012), "international credit bears watching because, in many boom-bust credit cycles in the past, such credit tended to grow faster than overall credit during the boom".[2]

But is "international credit" synonymous with "foreign bank credit"? How are these concepts similar, how are they different? This paper builds on the earlier work mentioned above by investigating the role that foreign banks played in facilitating credit booms in emerging market economies (EMEs). *Direct* cross-border credit – where banks outside the borrower country extend credit to non-banks inside the country – is, almost by definition, extended by foreign banks. Thus, in those countries where direct cross-border credit drove the domestic credit boom, foreign banks obviously have a central role (Hills and Hoggarth (2013)). But *indirect* cross-border credit – whereby banks in the borrowing country fund their domestic credit to non-banks with cross-border liabilities – was the driving factor in many countries. And in these countries, both foreign and domestic banks are potentially culpable.

To lay the groundwork, in Section 2 we use the BIS international banking statistics (IBS) to first review the dimensions of international credit to non-banks in a particular borrower country. In addition to the direct and indirect channels mentioned above, we also examine the share of credit denominated in foreign currencies.

We then introduce a measure of foreign bank participation in borrower countries, defined as the share of total bank credit to non-banks that is extended by foreign-owned banks, whether they are located in the borrower country or abroad. This measure differs from those used in previous studies on foreign bank ownership. First, its starting point is *total* bank credit to non-banks in a country, which places the focus squarely on the borrower. By contrast, most existing work places the focus on the banking sector in a particular country and the share of banks that are foreign owned. While this has the advantage of capturing the full balance sheet of these foreign banks' local operations, such measures suffer from two problems. First, the lack of granularity in the data means that the share of credit directed to resident borrowers cannot be isolated. Second, these measures by construction miss the cross-border credit extended by foreign banks outside the country to non-banks in the country.

From there, we investigate two main questions using a sample of 30 EMEs. First, what characteristics explain the differences in foreign bank participation rates across countries? In Section 3, we link our measure of foreign bank participation to country

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characteristics that capture market development, financial openness and size. Unsurprisingly, we find that countries with more open capital accounts, and with larger domestic financial sectors, tend to have a higher share of total bank credit that is provided by foreign headquartered banks.

Second, what role did foreign banks play in the credit booms pre-crisis and in the post-crisis busts? For this analysis in Section 4, we adopt the framework used in Avdjiev et al (2012) and examine the drivers of credit booms, defined as the change in a borrower country's credit-to-GDP ratio in the 2002–08 period. We find that countries with a higher foreign bank participation rate tended to have greater increases in their credit-to-GDP ratios in the pre-crisis period. However, much of this was driven by the role of international credit, or credit backed by liabilities outside the country and which provided to be highly unstable during the crisis. Evaluating the role of foreign banks *independent* of the type of credit, by simultaneously including measures of international credit and the foreign bank participation rate in the regression framework, yields a more nuanced view. The results of this exercise suggest that international credit, much of which was indeed provided by foreign banks, remained the key driver of credit booms. But foreign banks' local operations in borrower countries were a source of stability, particularly if these local operations were funded with local liabilities.

Section 5 concludes with some policy implications. Post-crisis regulatory initiatives have been targeted at making banks safer, and have provided policy makers with more tools to monitor, and counter if necessary, excessive growth in cross-border bank credit. For example, "jurisdictional reciprocity", a provision in the Basel III framework, can potentially help supervisory authorities take a coordinated approach in their application of capital buffers through the business cycle. The lessons learned from the 2002–10 boom-bust cycle in global bank credit may apply to overall credit growth cycles as well. Post-crisis, many internationally active creditor banks have reduced their global footprint. In response, corporations around the world, but particularly in EMEs, have taken advantage of low dollar borrowing costs in bond markets. The lessons from the bank-induced boom-bust credit cycle documented here should have a bearing on how policy makers think about the post-crisis surge in "non-bank-to-non-bank" capital flows via bonds, for which fewer regulatory tools are available.

2. The dimensions of international bank credit

To assess the role that foreign banks play in the credit cycle in particular countries, we combine various slices of the BIS IBS with national data on domestic bank credit (ie Domestic Credit from the IMF *International Financial Statistics*). Our approach follows closely that used in Avdjiev et al (2012), which detailed several of the dimensions of international credit shown in Graph 1. We build on that analysis, however, by extending the metrics considered to include *ownership*, with a focus on the foreign bank participation rate in selected EMEs. As discussed below, foreign banks can be a source of stability or can contribute to credit booms in borrower countries, depending on how these banks' operations are structured.

Dimensions of international bank credit

Credit in foreign and domestic currencies   Graph 1
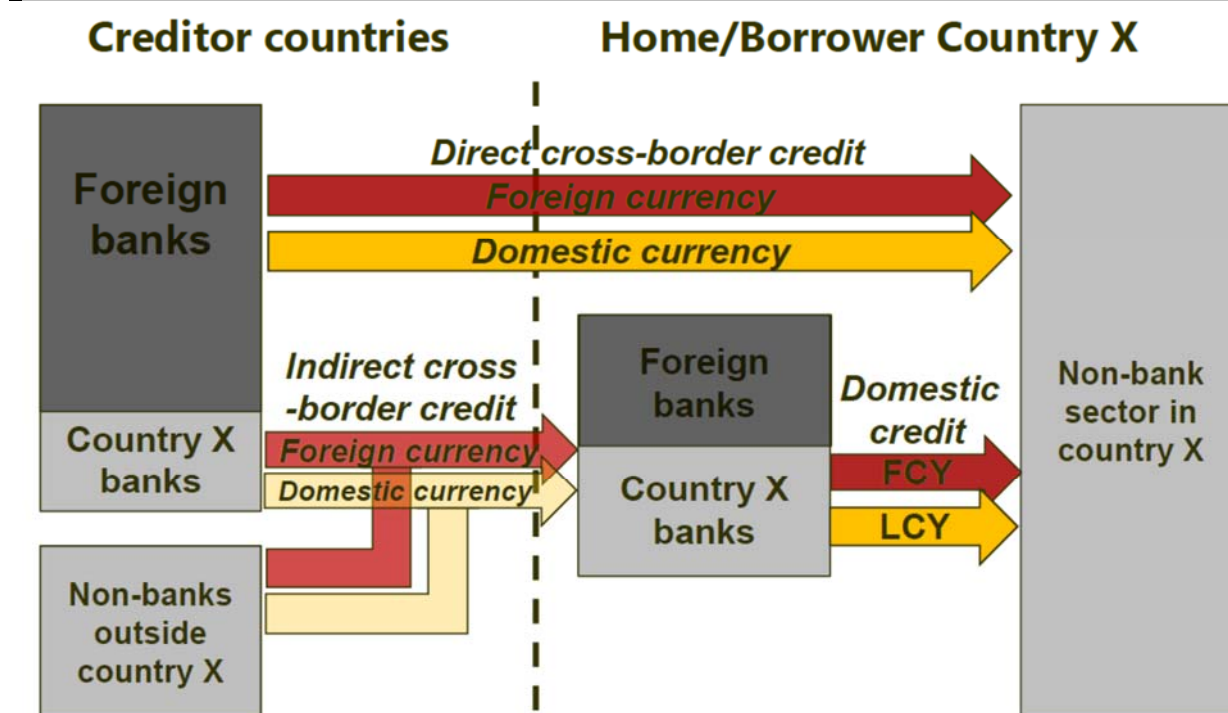
The BIS IBS are particularly well suited for this exercise because they contain various breakdowns that are not generally available in other sources of data used to examine the role that foreign banks play (eg Bankscope and SNL Financial). In particular, for banks' claims (ie assets) positions, the IBS contain information about the location (country) and sector of the counterparty. In addition, they also show banks' claims on a particular country separately by location of the booking office. Thus, banks' cross-border claims on counterparties in country X can be identified separately from their claims booked by their affiliates (ie branches and subsidiaries) located in the borrower country (ie "local" claims).[3]

With this starting point, we use slices of the BIS IBS (both the BIS consolidated banking statistics (CBS) and the BIS locational banking statistics (LBS)) to derive estimates of the various "dimensions" of international credit. The first two focus on the extent to which credit to non-banks is supported by funding from outside the country. This takes the form of *direct cross-border credit*, whereby banks outside the country lend cross-border to non-banks inside the country, and *indirect cross-border credit*, whereby banks inside the country finance their domestic credit by funding it with cross-border liabilities. In both cases, the funding that supports the credit to non-banks is sourced outside the borrower country.

To be concrete, we construct the following ratios:

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[3]   It is important to note that the BIS IBS are not at the level of individual banks. Rather, they are aggregated either by location of booking office (eg banks in the United Kingdom, tracked in the BIS Locational Banking Statistics (LBS)) or by nationality of the parent banks (eg UK-headquartered banks, tracked in the BIS Consolidated Banking Statistics (CBS)).

a. <u>Direct cross-border (XB) bank credit share:</u> Share of cross-border credit to non-banks in total bank credit to non-banks. Total bank credit to non-banks is domestic credit, as reported in the IMF *International Financial Statistics*, plus total cross-border credit to non-banks in the country, from the LBS.

$$Direct\ XB\ Share = \frac{XB^{NB}}{DC + XB^{NB}}$$

b. <u>Direct plus indirect cross-border bank credit share:</u> Share of direct cross-border bank credit to non-banks and net cross-border borrowing by banks in the country to total bank credit to non-banks in the country. This latter piece is the amount of domestic credit extended by banks in the country that is financed by cross-border liabilities; in other words, credit to non-banks in the country *via banks in the country.*

$$Direct + Indirect\ XB\ Share = \frac{XB^{NB} + NetXB\ bank\ liab}{DC + XB^{NB}}$$

Several country cases in Graph 2 highlight to varying degrees the roles that direct and indirect cross-border credit played in the run-up to the 2007–09 financial crisis. As Avdjiev et al (2012) make clear, a focus on only one piece is clearly incomplete. Direct cross-border credit to non-banks in Ireland (left-hand panel) accounted for more than half of the stock of total bank credit to non-banks in the country by 2008. In Hungary and Latvia (centre and right-hand panels), indirect cross-border credit played a more important role (dashed red lines). Foreign banks channelled funds (interoffice) cross-border to their subsidiaries in these countries, which in turn extended foreign currency loans to residents (McCauley (2010)).

Direct and indirect bank credit to non-banks in selected European countries[1]

In billions of US dollar at constant end-Q2 2013 exchange rates[1]   Graph 2

- - - Total Bank Credit (Unadj)[1]   ▬ Direct Cross-border (FX adj)[2]
Domestic Credit (FX adj)   • • • Indirect Cross-Border[3]
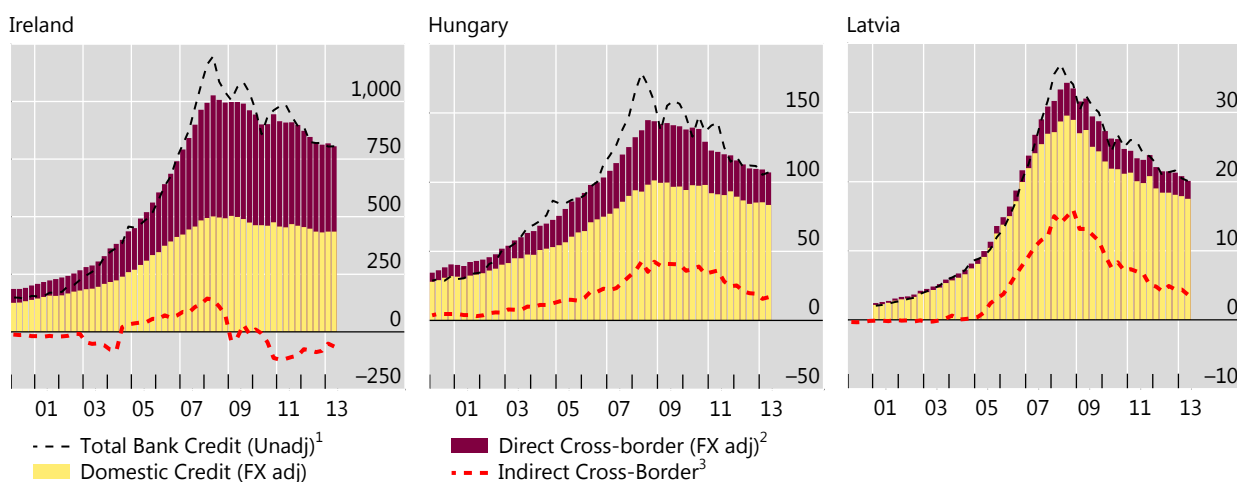
[1] The stacked bars indicate total bank credit expressed in US dollars at constant end-Q2 2012 exchange rates, and thus exclude changes in stocks due to movements in exchange rates. The dotted black line shows unadjusted total bank credit converted into US dollars at contemporaneous exchange rates.   [2] BIS reporting banks' cross-border claims on non-banks located in the country in the panel title.   [3] Net cross-border borrowing (liabilities minus claims) by banks located in the country. For non-BIS reporting countries (Hungary and Latvia), BIS reporting banks' net cross-border claims on banks in the country.

Sources: IMF, *International Financial Statistics*; BIS locational banking statistics; BIS consolidated banking statistics; authors' calculations.

This highlights the importance of *foreign currency credit*, which introduces vulnerabilities for both the borrower country, which may face difficulty in repaying this credit if the domestic currency depreciates, and for the creditor banks, which absorb much of the associated losses. Importantly, this vulnerability can arise regardless of whether the credit is locally-booked or extended cross-border. Previous work has focused primarily on foreign currency-denominated *cross-border* bank credit, which is available directly in the BIS LBS. The difficulty has always been getting reasonable estimates of the share of foreign currency credit in domestic credit. For some countries (ie those that report in the BIS LBS), we are able to measure the foreign currency component of domestic bank credit relatively precisely. For others, the approach taken here is to estimate this share using various combinations of the BIS IBS, as described in the Appendix. These estimates are not perfect, but they are arguably more complete than assuming that domestic credit is denominated in the domestic currency, a common but very strong assumption. With this caveat in mind, the third dimension of international credit that we explore is:

c. Foreign currency share: The share of total bank credit that is denominated in currencies other than the currency of the host country. See the Appendix for a description of how the numerator is constructed.

$$FRN\,Cur\,Share = \frac{Frgn\,Curr\,Credit}{DC + XB^{NB}}$$

Finally, we introduce our key metric of interest in this paper, the foreign bank participation rate (*FBP Rate*) (Graph 3). The focus of the first two ratios above is the national border of the borrower country; they track the extent to which credit is booked and/or funded outside the country. By contrast, the *FBP Rate* focuses squarely on the ownership of the banks that extend credit, regardless of whether the booking office is located inside or outside the country (McGuire and Tarashev (2005a, 2005b)).

Median foreign bank participation rates and international credit shares[1]

In per cent   Graph 3

Emerging Asia[2]   Latin America[3]   Central and eastern Europe[4]

Median *FBP Rate*   Median *Direct + Indirect XB Share*
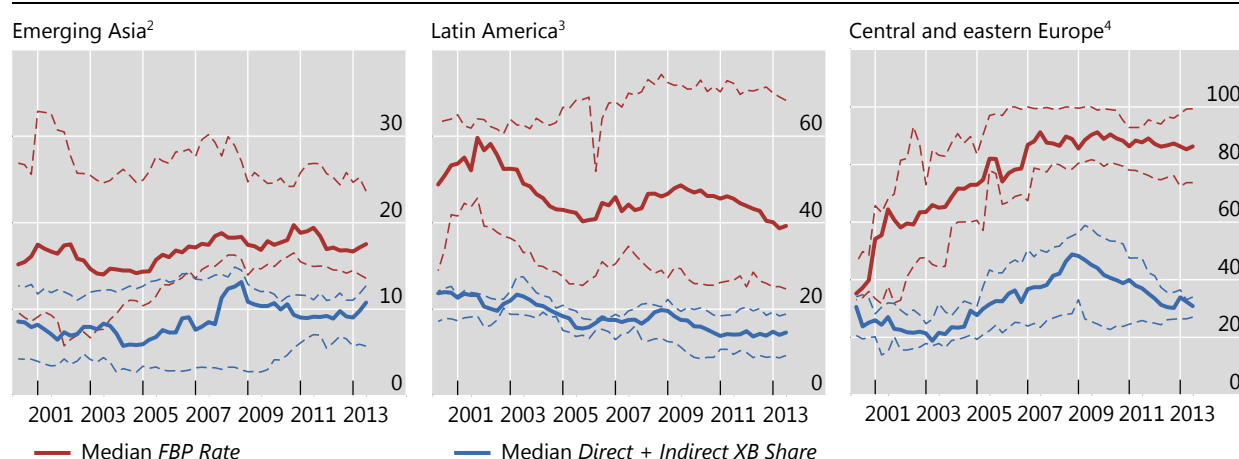
[1] Solid lines depict the median value of the indictor listed in the legend while dashed lines of the same colour depict the upper and lower quartile values.   [2] Emerging Asia includes China, Chinese Taipei, India, Indonesia, Korea, Malaysia, the Philippines and Thailand.   [3] Latin America includes Argentina, Brazil, Chile, Colombia, Mexico and Peru.   [4] Central and eastern Europe includes Bulgaria, the Czech Republic, Estonia, Hungary, Lithuania, Poland, Slovenia, Slovakia, Romania and Turkey.

Sources: IMF, *International Financial Statistics*; BIS consolidated banking statistics.

d. Foreign bank participation rate (*FBP Rate*): The denominator is that used above: total bank credit to non-banks in a borrower country. The numerator is the amount of this total credit that is booked by banks headquartered outside the borrower country. This includes foreign banks' international claims on non-banks ($INTL^{NB}$), comprised of cross-border claims (in all currencies) plus claims extended by bank affiliates inside the borrower country and denominated in non-local currencies; as well as these affiliates' locally-extended claims in the local currency (*LL*). For this latter piece, the parameter α denotes the estimated share of *LL* to the non-bank sector.[4]

$$FBP\,Rate = \frac{INTL^{NB} + \alpha * LL}{DC + XB^{NB}}$$

The *FBP Rate* differed markedly across regions in mid-2013, with wide variation across countries within each region. Asia-Pacific EMEs stood out with relatively low median *FBP Rates* (Graph 3, left-hand panel). As shown in Graph 4, the *FBP Rate* for China remained at below 3% until mid-2013, just slightly higher than a decade ago. Similarly, Chinese Taipei, Korea and Thailand all had *FBP Rates* below 20% in recent years. Central and eastern Europe, by contrast, had a higher median rate, near 80% (Graph 3, right-hand panel), with the Czech Republic, Hungary and Poland the main drivers (Graph 5). Latin America (Graph 3, centre panel) has its share of countries with relatively high rates (eg Mexico and Chile, Graph 5), but also countries with relatively low rates (eg Brazil).

How do *FBP Rates* in EMEs compare with the other dimensions of international credit discussed above? Graph 4 plots the four metrics for nine Asia-Pacific EMEs, and Graph 5 for nine EMEs in Latin America (top row), eastern Europe (middle row) and elsewhere (bottom row). For several of these economies, both the level and the evolution of the *FBP Rates* are similar to those for the other metrics. This is particularly true for Hungary, India, Indonesia and Russia, and to a lesser extent for the Philippines and Turkey. But in many others, the level of the *FBP Rate* is substantially higher than either the foreign currency share of credit (*FRN Cur Share*), or the share of direct and indirect cross-border credit in total credit (*Direct+Indirect XB Share*). This mainly reflects the fact that foreign banks in these countries have relatively large local operations that extend credit in the local currency. This drives up the *FBP Rate* but, if these foreign banks' local credit is also funded locally and in the local currency, then there is no contribution to either foreign currency credit or cross-border credit. As shown in McGuire and von Peter (2016), local currency credit that was also locally funded proved to be a source of stability in the wake of the financial crisis.

Across key developed countries (Australia, Japan and New Zealand) and financial centres (Hong Kong SAR and Singapore) in Asia-Pacific, *FBP Rates* are more varied (Graph 5, bottom row, and Graph 6). Australia (around 20% at end-2015) and Japan (<5%) are in line with the EMEs in the region. By contrast, New Zealand, where

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[4] Using the CBS, there are two ways to construct the *FBP Rate*. The CBS on an ultimate risk basis (UR basis) provide a complete breakdown of foreign claims by counterparty sector, and thus total foreign claims on non-banks can be isolated in the numerator. Unfortunately, the CBS (UR basis) start only in 2005. By contrast, the CBS on an immediate risk basis (IR basis) used in this paper have a counterparty sector breakdown for international claims (*INTL*), but not for local claims in local currencies (*LCLC*), and thus not for total foreign claims (*FC = INTL + LCLC*). To estimate α, we use the share of claims on non-banks in total international claims. A comparison of the two versions of the *FBP Rate* post-2005 shows that they are very similar.

Australian banks have a large presence, and the financial centres of Hong Kong and Singapore all have exceptionally high *FBP Rates*, above 80%.

Dimensions of international credit to non-banks in Asia-Pacific

In per cent

Graph 4
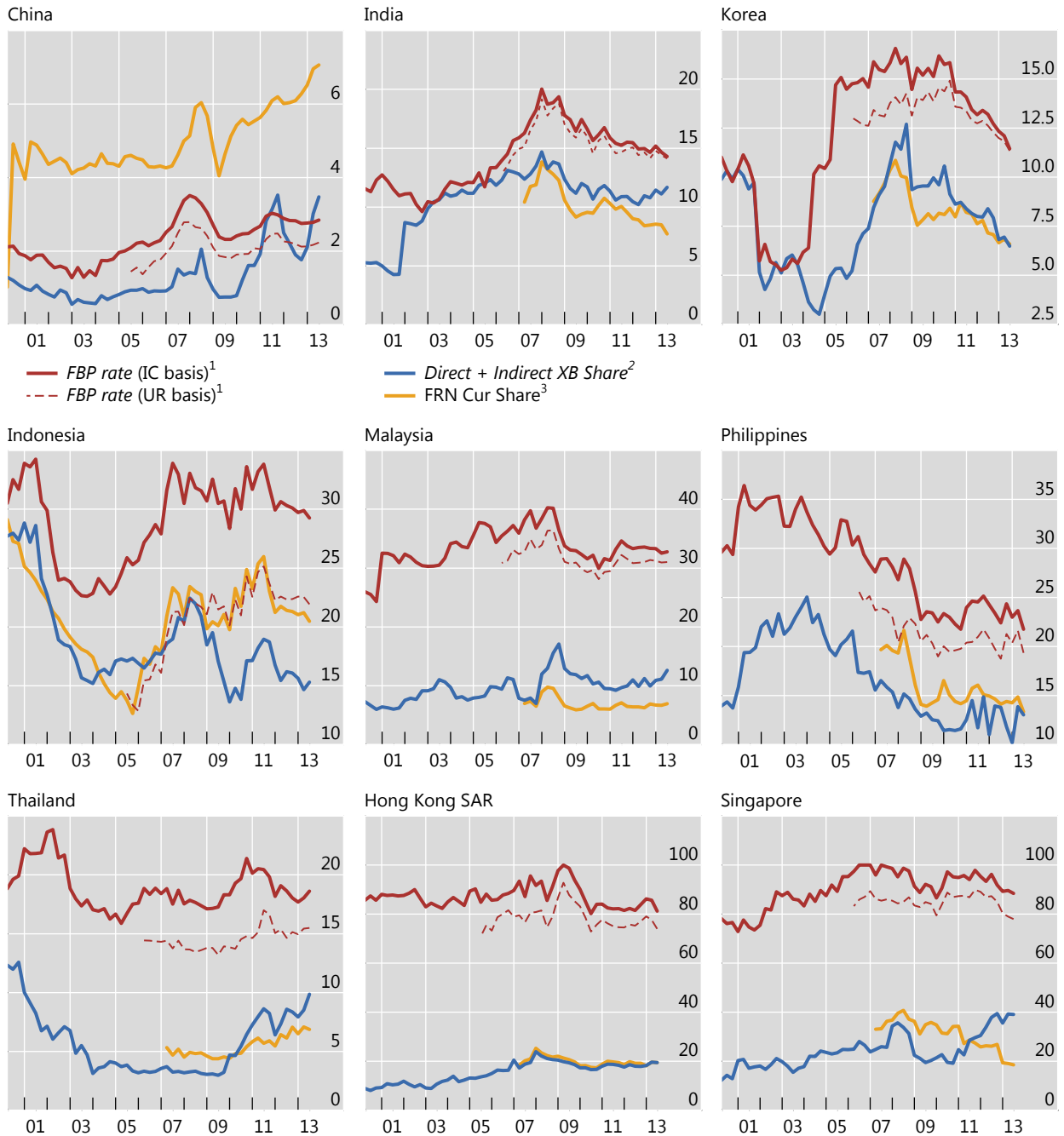
China

India

Korea

Indonesia

Malaysia

Philippines

Thailand

Hong Kong SAR

Singapore

— *FBP rate* (IC basis)[1]
-- *FBP rate* (UR basis)[1]
— *Direct + Indirect XB Share*[2]
— FRN Cur Share[3]

[1] The solid red line is the *Foreign Bank Participation Rate* (*FBP Rate*) based on the BIS Consolidated Banking Statistics (immediate counterparty (IC) basis). The dashed red line is the *FBP Rate* based on the BIS CBS (UR basis). See footnote 4 for a discussion of the differences in these rates. [2] The ratio of BIS reporting banks' cross-border claims on non-banks located in the country *plus* net cross-border borrowing by banks located in the country (if positive) to total bank credit to non-banks in the country. Total bank credit is the sum of domestic credit to non-banks plus cross-border credit to non-banks. [3] Estimated share of total bank credit to non-banks that is denominated in currencies other than the domestic currency.

Sources: BIS consolidated banking statistics (IC basis and UR basis); BIS locational banking statistics; national data; authors' calculations.

Dimensions of international credit to selected emerging market economies

In per cent

Graph 5

Brazil

Chile

Mexico

— *FBP rate* (IC basis)[1]
- - *FBP rate* (UR basis)[1]

— *Direct + Indirect XB Share*[2]
— FRN Cur Share[3]

Hungary

Poland

Czech Republic

Russia

Turkey

South Africa

[1] The solid red line is the *Foreign Bank Participation Rate* (*FBP Rate*) based on the BIS Consolidated Banking Statistics (IC basis). The dashed red line is the *FBP Rate* based on the BIS CBS (UR basis). See footnote 4 for a discussion of the differences in these rates.   [2] The ratio of BIS reporting banks' cross-border claims on non-banks located in the country *plus* net cross-border borrowing by banks located in the country (if positive) to total bank credit to non-banks in the country. Total bank credit is the sum of domestic credit to non-banks plus cross-border credit to non-banks.   [3] Estimated share of total bank credit to non-banks that is denominated in currencies other than the domestic currency.

Sources: BIS consolidated banking statistics (IC basis and UR basis); BIS locational banking statistics; national data; authors' calculations.

Dimensions of international credit in selected developed economies

In per cent Graph 6

Australia | Japan | New Zealand

— FBP rate (IC basis)[1]   — Direct + Indirect XB Share[2]
- - - FBP rate (UR basis)[1]   — FRN Cur Share[3]

[1] The solid red line is the *Foreign Bank Participation Rate* (*FBP Rate*) based on the BIS Consolidated Banking Statistics (IC basis). The dashed red line is the *FBP Rate* based on the BIS CBS (UR basis). See footnote 4 for a discussion of the differences in these rates.   [2] The ratio of BIS reporting banks' cross-border claims on non-banks located in the country *plus* net cross-border borrowing by banks located in the country (if positive) to total bank credit to non-banks in the country. Total bank credit is the sum of domestic credit to non-banks plus cross-border credit to non-banks.   [3] Estimated share of total bank credit to non-banks that is denominated in currencies other than the domestic currency.

Sources: BIS consolidated banking statistics (IC basis and UR basis); BIS locational banking statistics; national data; authors' calculations.

3. Foreign bank participation in EMEs

While there is an extensive literature on the role of foreign banks in EMEs (see Claessens and van Horen (2014) and references therein), our measure of foreign bank participation differs in a few important aspects. Many studies that focus on the ownership dimension of international banking have focused on the effect of foreign bank entry (eg Claessens et al (2001), De Haas and Van Lelyveld (2006), Claessens and van Horen (2014)), including cross-border mergers (Focarelli and Pozzolo (2001), Buch and DeLong (2004)). In these studies, ownership is the determining factor.[5]

Foreign bank activity measured in this way, however, does not capture the full extent of foreign banks' role in providing credit to non-banks in the host country. Specifically, standard ownership-based measures (a) miss the cross-border credit to non-banks in the country provided by foreign banks located outside, and (b) overstate the amount of credit that the resident offices of foreign banks provide to resident non-banks, since some of these banks' credit goes to borrowers outside

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[5]   On the other side of the spectrum, a large number of other multi-country studies have focused solely on cross-border lending (see McGuire and Tarashev (2008), Čihák et al (2011), Popov and Udell (2012), Kalemli-Ozcan et al (2013), and references therein). Many of these studies do not capture the larger part of foreign bank activity which is conducted locally (see Graphs 4–6). Important exceptions are studies which look at financial shock transmissions through international banks (for instance Cetorelli and Goldberg (2011)) or modes of foreign bank activity (García-Herrero and Martínez Pería (2007), Buch et al (2011), Cetorelli and Goldberg (2012)).

the country. In other words, they do not simultaneously isolate the nationality of the creditor bank and the location of the non-bank borrower.

The *FBP Rate* measure introduced above captures both of these dimensions. It thus allows us to examine how foreign banks, whether located inside or outside the country, contribute to credit growth to borrowers inside the country. As a first check, and to convey the basic features of the *FBP Rate*, we conduct regression analysis to better understand what drives the variation in this measure across our sample of 30 EMEs.[6] In particular, we are interested in how the *FBP Rate* correlates with widely-used measures of financial openness and financial development in EMEs. With annual data from 2002 to 2011, we run a linear panel regression of the form:

$$FBPRate_t^i = \mu + \beta \cdot FinOpenness_{t-1}^i + \gamma \cdot FinDevelopment_{t-1}^i + \varepsilon_t^i$$

where i denotes the borrower country and t denotes the year. For financial openness (*FinOpenness*) our main proxies are the Chinn-Ito index of capital account openness (Chinn and Ito (2008)), net inward FDI relative to GDP, and various measures of economic freedom from the Heritage Foundation.[7] These latter measures are meant to capture the ease of conducting financial activity (eg the rule of law, regulatory efficiency, market openness), and include a measure of the cost to new firms of entering the financial industry (*financialFreedom*). Our indicators of financial development are the size of financial markets as well as the size of assets in the life insurance sector.[8] In each regression, we also control for the size of the economy.

The results of this exercise are presented in Table 1, and confirm our intuition that greater openness is associated with higher *FBP Rates*. The coefficient on the Chin-Ito index, for example, is in all specifications positive and highly statistically significant. The coefficients on other variables that indicate openness (eg the net inward FDI-to-GDP ratio and the measures of economic freedom) all tell a similar story. These measures go a long way in explaining the variation in *FBP Rates* across the sample, as evidenced by the relatively high R-squared values in virtually all model specifications.

While the above factors are clearly relevant for the level of foreign bank participation, they are not necessarily informative about how foreign banks influence credit conditions in EMEs. Higher foreign bank participation may lead to deeper credit markets, but may also mean that international financial shocks have a stronger negative impact on credit conditions. We assess in the next section the role of foreign banks, in particular in relation to the other dimensions of international credit, in the credit boom-bust cycles in EMEs around the financial crisis.

4. The role of foreign banks in boom-bust credit cycles

Many EMEs experienced rapid credit growth in the run-up to the 2007–09 global financial crisis, and a rapid credit contraction thereafter. To what extent did foreign headquartered banks contribute to this boom-bust cycle? To what extent were they a source of stability? Answering this question requires assessing the role of foreign banks independently from that of the other dimensions of international credit. In this

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[6]   See the Appendix for the list of countries.

[7]   See http://www.heritage.org/index.

[8]   All of these indicators are taken from the World Bank's *Financial Structure and Development* dataset.

section, we use regression analysis to test whether the nationality of the creditor banks exacerbated or mitigated credit booms over and above the role played by measures of cross-border (direct and indirect) credit.

Characteristics of foreign bank participation in EMEs[1]

Dependent variable: *FBP Rate*; annual data 2002–2011   Table 1

Model	(1)	(2)	(3)	(4)		(5)	(6)
Chinn-Ito index[2]	56.96*** (14.23)	61.47*** (16.53)	57.47*** (13.35)	45.98*** (9.74)	Public bonds-to-GDP ratio[6]	0.29* (1.86)	0.10 (1.06)
Net inward FDI-to-GDP ratio[3]		0.59*** (2.70)	0.57*** (2.76)	0.43** (2.53)	Private bonds-to-GDP ratio[7]	–0.34*** (–4.37)	–0.55*** (–7.02)
Overall economic freedom[4]			0.34* (1.81)		Stock market capitalisation[8]	0.04 (0.80)	0.10*** (3.02)
Property rights index[4]				–0.16* (–1.82)	Life insurance premia[9]	–2.20*** (–3.13)	–1.24** (–2.32)
Freedom from corruption index[4]				–0.02 (–0.15)	Chinn-Ito index		56.60*** (10.16)
Business freedom index[4]				–0.24* (–1.91)	Net inward FDI-to-GDP ratio[3]		0.27 (1.47)
Monetary freedom index[4]				–0.04 (–0.45)	Overall economic freedom[4]		1.64*** (5.53)
Trade freedom index[4]				0.35*** (3.60)			
Investment freedom index[4]				0.27*** (2.73)			
Financial freedom index[4]				0.48*** (5.13)			
log GDP[5]	–5.80*** (–5.90)	–5.08*** (–5.57)	–4.84*** (–5.18)	–2.90*** (–3.09)	log GDP		0.87 (0.68)
Constant	43.99*** (6.66)	37.47*** (6.04)	17.82 (1.32)	–2.28 (–0.18)	Constant	44.48*** (10.64)	–90.64*** (–4.39)
No of obs.	348	312	312	312	No of obs.	236	229
Adj. R-squared	0.48	0.63	0.64	0.70	Adj. R-squared	0.07	0.64

Note: Values in parentheses are *t statistics*. Levels of statistical significance based on robust standard errors are indicated as follows: *** = 1%, ** = 5% and * = 10%.

[1] The table shows the results of panel regressions (models (1)–(6)) of the *FBP Rate* of country i year t on the various right-hand side variables listed in columns 1 and 6. All right-hand side variables pertain to borrower countries (ie are indexed by i and t).   [2] Capital account openness as measured by Chinn and Ito (2008), where the value for maximal openness is normalised to unity. It is based on binary dummy variables that codify restrictions on cross-border financial transactions reported in IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*.   [3] Inward minus outward annual foreign direct investment (FDI) flows relative to annual nominal GDP.   [4] Indices and subindices for economic freedom, where 0 denotes the lowest level and 100 the highest level of economic freedom. See the Appendix for a more detailed description of the individual indices.   [5] Natural logarithm of annual nominal GDP in billions of US dollars.   [6] Outstanding public domestic debt securities issued by the government as a share of GDP in per cent.   [7] Outstanding private domestic debt securities issued by financial institutions and corporations as a share of GDP.   [8] Ratio of stock market capitalisation to GDP in per cent.   [9] Ratio of life insurance premia paid in a given country to GDP in per cent.

Sources: BIS international banking statistics; IMF, *World Economic Outlook*; IMF Direction of Trade Statistics; Heritage Foundation; Swiss Re, *Sigma*; World Bank Financial Structure and Development Dataset; authors' calculations.

To assess the boom phase, we calculate the change in the ratio of total bank credit to GDP for each of the 30 countries in our sample over 2002–08, and then examine the drivers of the cross-sectional variation in this metric. Graph 7 shows this metric on the y-axis in each panel, and relates it to the dimensions of international

credit introduced in Section 2. As first shown in Avdjiev et al (2012), changes in the share of direct cross-border credit alone are not sufficient to explain the rise in credit-to-GDP ratios across the 30 EMEs in our sample (top left-hand panel). Adding the indirect share – ie cross-border net borrowing by resident banks to finance domestic credit – increases the explanatory power considerably (top right-hand panel).

International credit and foreign banks during the boom period (2002–08)[1]

In per cent   Graph 7

Direct cross-border credit (*Direct XB Share*)[2]

Direct & indirect cross-border credit (*Direct+Indirect XB Share*)[3]

Foreign bank participation (*FBP Rate*)[4]

Foreign currency shares (*FRN Cur Share*)[5]
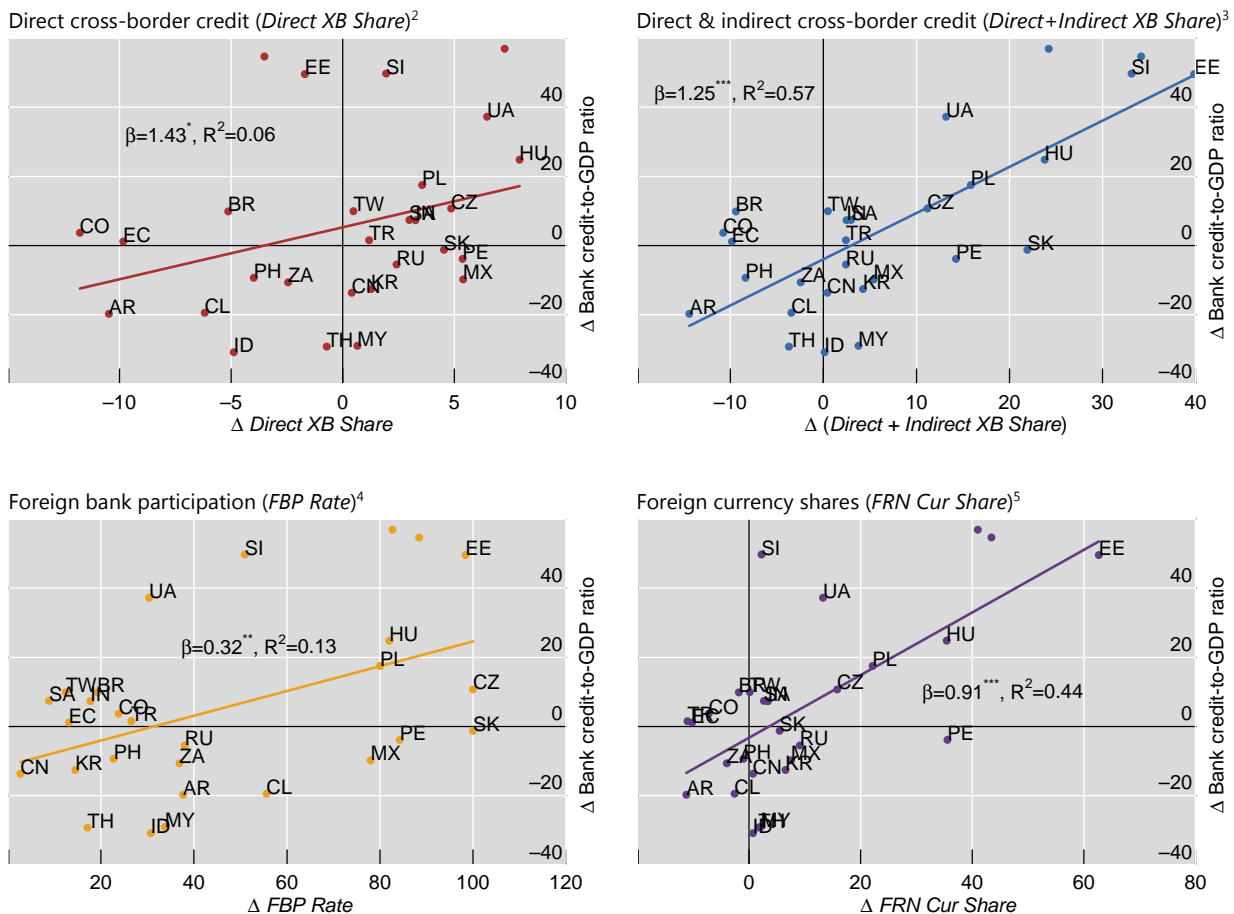
[1] The y-axis in all panels shows the change in the ratio of total bank credit (including credit to governments) to GDP over the 2002–08 period. Total bank credit is the sum of domestic credit and cross-border bank credit to non-banks in the country. The lines indicate OLS predicted values. The regression coefficient β for each line is shown in the panel, with significance levels denoted as *** for 1%, ** for 5%, and * for 10%.   [2] The x-axis shows the change in the ratio of direct cross-border credit over total bank credit to non-banks.   [3] The x-axis shows the change, over the 2002–08 period, in the ratio of direct cross-border credit plus net cross-border borrowing by banks in the country (if positive) to total bank credit to non-banks.   [4] The x-axis shows the average foreign bank participation rate (*FBP Rate*) over the period 2002–08.   [5] The x-axis shows the change in the estimated share of total bank credit denominated in foreign currencies over the 2002–08 period.

Sources: BIS international banking statistics; IMF, *International Financial Statistics*; authors' calculations.

Models (7) and (8) in Table 2 show that this basic result is robust to the inclusion of other control variables, in particular those used in the previous section. The key point is that cross-border credit, whether it was routed directly to non-banks or indirectly via resident banks, tended to be the *marginal* source of credit in EMEs, contributing greatly to rising credit-to-GDP ratios. As such, both forms of cross-

border credit bear watching by policy makers concerned about unsustainable credit growth.

Drivers of credit booms in EMEs (2002–08)[1]

Dependent variable: change in bank credit-to-GDP ratio (2002–08)

Table 2

Model	(7)	(8)	(9)	(10)	(11)	(12)
Δ *Direct XB Share*[2]	1.22**					
	(2.09)					
Δ (*Direct+Indirect XB Share*)[3]		1.09***			1.37***	
		(4.90)			(6.87)	
FBP Rate (average 2002–08)[4]			0.07		−0.34***	−0.29*
			(0.37)		(−4.03)	(−1.89)
Δ *FRN Cur Share*[4]				0.70***		0.92***
				(3.17)		(4.21)
Bank credit-to-GDP ratio (end-2002)[6]	−0.32***	−0.26***	−0.31***	−0.25***	−0.31***	−0.28***
	(−4.29)	(−4.74)	(−3.38)	(−4.07)	(−6.67)	(−4.57)
Chinn-Ito index (end-2008)[7]	18.69	−7.24	15.14	1.22	3.85	10.97
	(1.49)	(−0.73)	(0.90)	(0.09)	(0.42)	(0.76)
Interest rate diff. (average 2002–08)[8]	−1.29	−0.92	−1.51	−0.75	−1.25*	−0.91
	(−1.63)	(−1.30)	(−1.60)	(−0.84)	(−1.80)	(−1.02)
FX volatility (average 2002–08)[9]	27.55**	17.30*	29.54*	20.61*	22.37**	24.70*
	(2.19)	(1.86)	(1.99)	(1.73)	(2.57)	(2.06)
Constant	8.63	15.76	7.60	7.80	23.90**	12.82
	(0.82)	(1.53)	(0.54)	(0.75)	(2.67)	(1.33)
No of obs.	28	28	28	28	28	28
Adj. R-squared	0.42	0.69	0.35	0.55	0.75	0.58

Note: Values in parentheses are *t statistics*. Levels of statistical significance based on robust standard errors are indicated as follows: *** = 1%, ** = 5% and * = 10%.

[1] The dependent variable is the change in the ratio of total bank credit (including credit to governments) to GDP over the 2002–08 period. Total bank credit is the sum of domestic credit and cross-border bank credit to non-banks in the country. [2] The change in the ratio of direct cross-border credit over total bank credit to non-banks. [3] The change in the ratio of direct cross-border credit plus net cross-border borrowing by banks in the country (if positive) to total bank credit to non-banks from 2002 to 2008. [4] Average of the *Foreign Bank Participation Rate* between 2002 and 2008. [5] Change in the estimated share of foreign currency credit in total bank credit from 2002 to 2008. [6] Total bank credit-to-GDP ratio at end-2002, as a measure of financial depth at the start of the sample period. [7] Capital account openness at end-2008 as measured by Chinn and Ito (2008), where the value for maximal openness is normalised to unity. It is based on binary dummy variables that codify restrictions on cross-border financial transactions reported in IMF, *Annual Report on Exchange Arrangements and Exchange Restrictions*. [8] The difference between short-term interest rates in each country and euro (for emerging European countries) and US dollar (for all other countries) short-term interest rates; average over the sample period. [9] Quarterly measure of exchange rate volatility generated from daily price data; average over the sample period. Eastern European exchange rates are measured against the euro; others against the US dollar.

Sources: BIS international banking statistics; IMF, *International Financial Statistics*; Bloomberg; authors' calculations.

But the question of whether foreign banks were or were not stabilising during this period remains. As noted above, direct cross-border credit is, almost by construction, provided by foreign banks. But indirect cross-border credit could pass through resident foreign banks or resident domestic banks. Moreover, foreign banks have large local claims positions in many EMEs (ie they contribute directly in domestic credit) that are mainly funded with local liabilities. Such locally-intermediated positions were found to be the most stable type of bank activity in the post-crisis period (Ehlers and Wooldridge (2015), McGuire and von Peter (2016)). Taken together, it is not clear *a priori* whether, overall, foreign banks contributed to, mitigated against, or had no effect on the rise in bank credit-to-GDP ratios in EMEs.

In a simple bi-variate regression (Graph 7, lower left-hand panel), the *FBP Rate* in the pre-crisis period (country average between 2002 and 2008) is positively related to the change in the credit-to-GDP ratio, albeit with considerably less explanatory power than the *Direct+Indirect XB Share* (top right-hand panel). By this measure, a greater presence of foreign banks seemed to contribute to the boom in total bank credit in the pre-crisis period. Note, however, that the *FBP Rate* is positively correlated with the (omitted) dimensions of international credit plotted in the top panels of Graph 7, and thus the result of this bi-variate regression may be biased.

To assess whether foreign bank participation had an effect on credit booms *independent of* the role of cross-border (direct and indirect) credit, we use a multivariate regression that includes both measures simultaneously, as well as additional controls (Table 2, Models (9) and (11)). With only the control variables (Model 9), the coefficient on the *FBP Rate* is statistically insignificant. However, a regression that simultaneously includes both the *FBP Rate* and the change in the *Direct+Indirect XB Share* (Model 11) tells a different story. Here, once the type of credit is explicitly controlled for, foreign bank participation seems to have had a dampening effect on credit booms in EMEs between 2002 and 2008.[9] In other words, cross-border credit (direct + indirect) boosted credit-to-GDP ratios. But while foreign banks were the source of a much of this cross-border credit, their local operations, particularly if funded by local liabilities, were more stable.

Once the crisis was under way, credit growth in virtually every economy slowed, and cross-border credit actually contracted at an alarming rate.[10] This went hand-in-hand with contractions in overall economic activity in many countries, as evidenced by negative GDP growth between 2007 and 2010. Did the presence of foreign banks help in mitigating these shocks? Were they a source of stability?

A priori, it is not clear that they would be, particularly given that the transmission of the crisis was largely through banks themselves. That is, the large internationally active banks that had piled into structured finance products (and that relied on unstable short-term dollar funding markets to do this) were hit hardest by the crisis. Shocks to their balance sheets elsewhere were the source of the shock to many EME borrower countries. At the same time, these global banks' local operations were, depending on the banking system, largely self-funding, and thus were insulated from the meltdown elsewhere on their consolidated balance sheets (McGuire and von Peter (2016)). As above, the relationship between the *FBP Rate* and the severity of the crisis in particular countries could go either way.

We assess this in Graph 8, which juxtaposes cumulative GDP growth (2008–10) against the level of the four different dimensions of international credit measured at end-2008 (x-axes).[11] Overall, a higher level of international credit at the onset of the

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[9]   Including the foreign currency credit share and the *FBP Rate* yields similar results (Model (12)).

[10]   See Avdjiev et al (2012) for a discussion of global bank credit growth in the wake of the crisis. In particular, while cross-border credit contracted, the growth in total bank credit in most countries actually remained positive (albeit at much lower rates) once the effect of currency valuations is taken into account. In a sample of 59 economies, only in six did total bank credit actually contract once these adjustments are made.

[11]   In contrast to the analysis above, the metric on the y-axes here is cumulative GDP growth (2008–10) rather than the change in the credit-to-GDP ratio. The reason for this switch is that credit-to-GDP ratios send misleading signals once a crisis is under way, since both the numerator and the denominator may be contracting but at different rates. If credit is sticky, because loans cannot be

crisis was generally associated with lower GDP growth in its wake (top left-hand panel). As above, the *Direct+Indirect XB Share* seems to be most strongly associated with lower economic activity, although the *FBP Rate* and the *FRN Cur Share* at end-2008 are similarly strong predictors.

International credit and foreign banks during the bust period (2008–10)[1]

In per cent   Graph 8

Direct cross-border credit (*Direct XB Share*)[2]

Direct & indirect cross-border credit (*Direct+Indirect XB Share*)[3]

Foreign bank participation (*FBP Rate*)[4]

Foreign currency shares (*FRN Cur Share*)[5]
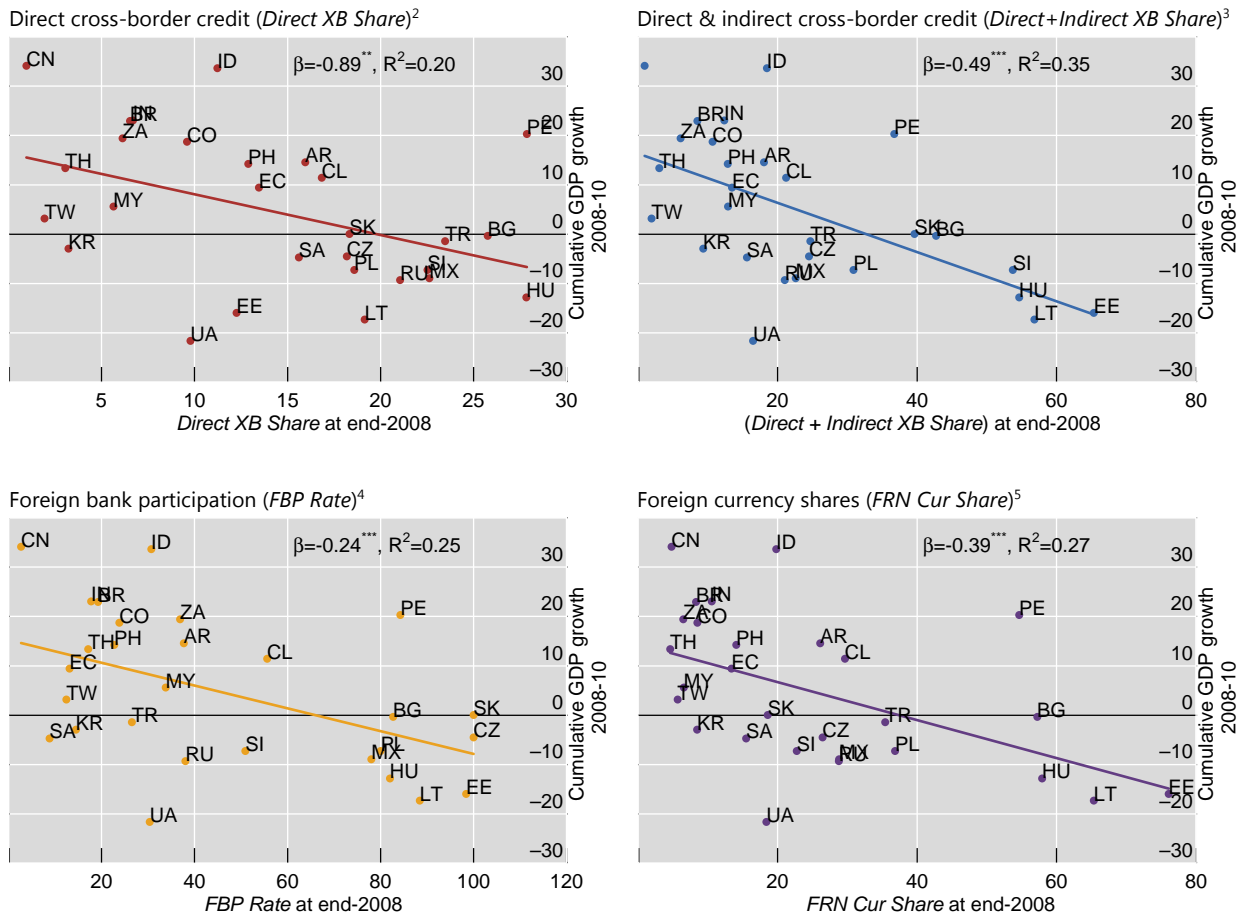
[1] The y-axis in each panel shows the cumulative growth in GDP during the post-crisis period of 2008–10. The lines indicate OLS predicted values. The regression coefficient β for each line is shown in the panel, with significance levels denoted as *** for 1%, ** for 5%, and * for 10%. [2] The x-axis shows the ratio of direct cross-border credit to total bank credit to non-banks (excluding governments) at end-2008. [3] The x-axis shows the ratio of direct cross-border credit plus net cross-border borrowing by banks in the country (if positive) to total bank credit to non-banks, at end-2008. [4] The x-axis shows the estimated *FBP Rate* at end-2008 [5] The x-axis shows the estimated share of total bank credit denominated in foreign currencies at end-2008.

Sources: BIS international banking statistics; IMF, *International Financial Statistics*; authors' calculations.

However, as shown in the multivariate regressions in Table 3, the destabilising role of foreign banks in the wake of the crisis is not so clear. A regression with the *FBP Rate* and controls (Model 15) indeed yields a negative coefficient that is significant at the 90% level. Taken at face value, a higher degree of foreign bank participation when the crisis started is associated with lower cumulative GDP growth later. This is consistent with stories that attribute the shock to EME borrowers to

called before they mature, and GDP growth takes a hit, credit-to-GDP ratios may well increase in response to a banking crisis.

supply shocks that hit those creditor banks that had invested heavily in the structured finance products that proved to be so toxic. Note, however, that in multivariate regressions that attempt to isolate the role of bank ownership from credit type, this result disappears. That is, in models that include the *Direct+Indirect XB Share* or *FRN Cur Share* measured on the eve of the crisis (Models 17 and 18), the coefficient on the *FBP Rate* is no longer significant. Claim type rather than ownership seems to have mattered more in the bust phase.

Post-crisis cumulative GDP growth in EMEs[1]

Percentage changes and shares   Table 3

Model	(13)	(14)	(15)	(16)	(17)	(18)
Direct XB Share (end-2008)[2]	−1.29** (−2.25)					
Direct+Indirect XB Share (end-2008)[3]		−0.68*** (−3.63)			−0.72*** (−3.07)	
FBP Rate (end-2008)[4]			−0.22* (−1.84)		0.03 (0.20)	−0.11 (−0.95)
FRN Cur Share (end-2008)[4]				−0.46** (−2.48)		−0.34* (−1.99)
Bank credit-to-GDP ratio (2008)[6]	0.34 (0.02)	11.92 (0.92)	−4.90 (−0.40)	4.24 (0.32)	11.95 (0.90)	5.99 (0.43)
Chinn-Ito index (2008)[7]	−0.17* (−1.87)	0.01 (0.17)	−0.06 (−0.77)	−0.02 (−0.25)	0.02 (0.21)	−0.03 (−0.32)
Interest rate diff. (average 2008-10)[8]	−0.21 (−0.21)	0.77 (0.83)	−0.53 (−0.59)	0.41 (0.39)	0.83 (0.85)	0.25 (0.23)
FX volatility (average 2008-10)[9]	−4.92 (−0.93)	−9.19 (−1.68)	−3.62 (−0.65)	−7.22 (−1.28)	−9.60* (−1.94)	−6.03 (−1.16)
Constant	40.72*** (4.20)	16.37 (1.63)	28.50*** (3.08)	19.84* (1.92)	15.75 (1.41)	21.52* (1.90)
No of obs.	27	27	27	27	27	27
Adjusted R-squared	0.24	0.34	0.19	0.23	0.30	0.22

Note: Values in parentheses are *t statistics*. Levels of statistical significance based on robust standard errors are indicated as follows: *** = 1%, ** = 5% and * =10%.

[1] The dependent variable is cumulative growth in GDP during the post-crisis period of 2008–10.   [2] The change in the ratio of direct cross-border credit over total bank credit to non-banks.   [3] The ratio of direct cross-border credit plus net cross-border borrowing by banks in the country (if positive) to total bank credit to non-banks at end-2008.   [4] *Foreign Bank Participation Rate* at end-2008.   [5] Estimated share of foreign currency credit in total bank credit at end-2008.   [6] Total bank credit-to-GDP ratio at end-2008, as a measure of the size of the boom.   [7] Capital account openness at end-2008 measured by the Chinn-Ito index, where the value for maximal openness is normalised to unity. See the Appendix for more detail.   [8] The difference between short-term interest rates in each country and euro (for emerging European countries) and US dollar (for all other countries) short-term interest rates; average over the period 2008–10.   [9] Quarterly measure of exchange rate volatility generated from daily price data; average over the period 2008–10. Eastern European exchange rates are measured against the euro; others against the US dollar.

Sources: BIS international banking statistics; IMF, *International Financial Statistics*; Bloomberg; authors' calculations.

To summarise the results of this section, cross-border credit had a destabilising effect in the pre-crisis boom phase in EMEs. And in the bust phase, countries that were more heavily reliant on cross-border credit on the eve of the crisis suffered larger contractions in GDP growth in subsequent years. In both phases, foreign banks' local operations were a source of stability. On the one hand, foreign banks were (generally speaking) the sole source of pure direct cross-border credit, which drove up credit-to-GDP ratios. On the other hand, foreign banks had large local operations which

drove up foreign bank participation rates. In cases where these were locally funded with local currency (eg Spanish banks in Latin America), foreign banks were a stabilising force.

5. Conclusions and policy implications

What role do foreign banks play for credit conditions in EMEs? This paper builds on the earlier work by Avdjiev et al (2012) by investigating the role that foreign banks played in facilitating the pre-crisis credit booms and post-crisis credit busts across emerging economies. Our findings suggest that it is not bank ownership that matters per se, but rather the structure of bank credit and how it is funded. Direct and indirect cross-border credit shares were more relevant determinants of credit conditions in EMEs around the 2007–09 financial crisis than were foreign bank participation rates.

Our findings partially reconcile two seemingly contradictory strands of literature on the effect of foreign bank participation in EMEs. On the one hand, many studies find a largely positive effect of foreign banks on the efficiency of domestic banks and domestic credit supply. On the other hand, foreign bank credit, in particular cross-border credit, exacerbated credit booms and busts in EMEs around the financial crisis. Foreign banks have large local operations in EMEs, by which they extend credit in the local currency that is also funded locally. This proved to be a source of stability in the wake of the financial crisis.

What are the implications for policy authorities? First, policy makers should watch international bank credit flows closely. In doing so, they should bear in mind the tools available to assess what constitutes "excessive" flows. BIS work on the early warning properties of various "gap" variables, in particular the "credit-to-GDP gap", has proven quite useful in this regard (Borio and Lowe (2002, 2004), Borio and Drehmann (2009)); such gap measures are now used to inform the calibration of countercyclical capital buffers (Drehmann, Borio and Tsatsaronis (2011), BCBS (2010)). The results in this paper show that monitoring both the direct and indirect channels of international bank credit is warranted.

Second, policy makers should keep abreast of the evolving regulatory toolkit available to dampen bank flows. The growth in international bank credit played a dominant role in the run-up to the 2007–09 financial crisis. And while domestic authorities have long had tools available to constrain the growth in domestic credit, they have not always had the tools to counter growth in cross-border bank credit coming in, since the creditor banks fall under the purview of supervisors elsewhere. Fortunately, some provisions in the Basel III framework may help in alleviating this problem. "Jurisdictional reciprocity", as detailed in BCBS (2010), should help promote supervisory coordination across jurisdictions. That is, supervisors in a jurisdiction seeking to dampen cross-border bank credit into that jurisdiction can coordinate with supervisory authorities abroad in setting buffer requirements on the creditor banks' cross-border positions.

Of similar vein is the post-crisis push in several jurisdictions for local capital requirements and "ring fencing" of banks' operations. The longer-term implications of this move are widely debated. The results in this paper do suggest that the structure of bank credit rather than the ownership of the creditor banks matters. Yet, while such regulatory changes may make banks more stable, they do so possibly at

the expense of smaller cross-border transfers of capital. Policy makers should continue to examine these trade-offs.

Finally, policy makers should not lose sight of other challenges that have emerged in the post-crisis era. Since 2009, cross-border bank credit has taken a back seat to bond issuance. Many banks, in particular European banks hit hard by the crisis, have retreated from foreign markets. Rather than borrowing from banks, corporations outside the United States – particularly in EMEs – have taken advantage of lower US dollar borrowing costs by issuing dollar bonds, the bulk of which were purchased by non-banks (McCauley et al (2015a, 2015b)). Such "non-bank to non-bank credit" is by definition less affected by many of the post-crisis regulatory initiatives targeted at the banking sector. As a result, policy makers have a renewed interest in the effectiveness of capital controls to mitigate unwanted capital flows (IMF (2010, 2011a, 2011b)).

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Appendix: supplementary tables

List of EMEs included in the empirical analysis

Table A1

	Name	ISO code		Name	ISO code
1	Argentina	AR	16	Mexico	MX
2	Bulgaria	BG	17	Malaysia	MY
3	Brazil	BR	18	Peru	PE
4	Chile	CL	19	Philippines	PH
5	China	CN	20	Poland	PL
6	Colombia	CO	21	Romania	RO
7	Czech Republic	CZ	22	Russia	RU
8	Ecuador	EC	23	Saudi Arabia	SA
9	Estonia	EE	24	Slovenia	SI
10	Hungary	HU	25	Slovakia	SK
11	Indonesia	ID	26	Thailand	TH
12	India	IN	27	Turkey	TR
13	Israel	IL	28	Chinese Taipei	TW
14	Korea	KR	29	United Arab Emirates	UA
15	Lithuania	LT	30	South Africa	ZA

Additional variable descriptions and sources

Table A2

Variable	Description	Source
Foreign currency share	The currency composition of banks' cross-border claims on non-banks in a country is captured in the BIS LBS, which break down cross-border claims into five major currencies (USD, EUR, JPY, GBP, CHF). The method for obtaining the currency breakdown of domestic credit to non-banks depends on the country. In the LBS, reporting countries provide the same breakdown for banks' local positions in foreign currencies, and thus the difference between this total and domestic credit is the amount in domestic currency. This yields the estimates for EMEs that themselves report the LBS (ie BR, CL, MX, KR, TR, ZA). For other EMEs, the foreign currency share of domestic credit is estimated as the difference between BIS reporting banks consolidated cross-border claims (UR basis) and their international claims (IR basis) (ie local claims in non-local currencies booked by foreign banks). Thus, the figures are incomplete for these countries because (a) there is no explicit currency breakdown for this piece, and thus assumptions are required to determine the USD, EUR, JPY, CHF and GBP shares; and (b) the positions of domestic banks' local foreign currency positions are not known. For (b), we assume for most countries that these banks' local positions are all in domestic currency.	BIS international banking statistics, national data, authors' calculations
Chinn-Ito index	Annual index measuring a country's degree of capital account openness, which considers the following four restrictions on external accounts: presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account transactions, and the requirement of the surrender of export proceeds.	Chinn and Ito (2008); http://web.pdx.edu/~ito/Chinn-Ito_website.htm
Economic freedom	Annual index for economic freedom country. Index from 0 for lowest economic freedom to 100 for highest economic freedom based on 10 factors in four broad categories: rule of law (property rights, freedom from corruption), limited government (fiscal freedom, government spending), regulatory efficiency (business freedom, labour freedom, monetary freedom), and open markets (trade freedom, investment freedom, financial freedom). The overall score is an equally weighted average.	Heritage Foundation www.heritage.org/index
Property rights index	0–100 measure of the degree to which a country's laws protect private property rights and the government enforces those laws.	Heritage Foundation
Freedom from corruption index	0–100 measure based on Transparency International's Corruption Perceptions Index (CPI).	Heritage Foundation
Business freedom index	0–100 measure of the ability to start, operate, and close a business that represents the overall burden of regulation as well as the efficiency of government in the regulatory process.	Heritage Foundation
Monetary freedom index	0–100 measure of price stability and the prevalence of price controls.	Heritage Foundation
Trade freedom index	0–100 composite measure of the absence of tariff and non-tariff barriers on imports and exports of goods and services.	Heritage Foundation
Investment freedom index	0–100 measure of constraints on the flow of investment capital, where 100 indicates no constraint.	Heritage Foundation
Financial freedom index	0–100 measure of banking efficiency as well as independence from government control and interference in the financial sector. It also considers whether banks are free to extend credit, accept deposits, and conduct operations in foreign currencies.	Heritage Foundation
Public bonds-to-GDP ratio	The value of outstanding public domestic debt securities issued by government as a share of GDP in per cent; both measured in US dollars. Public domestic debt securities are calculated as the arithmetic mean of the current and the previous year. Based on the BIS international debt securities (IDS) statistics.	World Bank Financial Development and Structure dataset (WB FDS dataset)
Private bonds-to-GDP ratio	The value of outstanding private domestic debt securities issued by financial institutions and corporations as a share of GDP, both measured in US dollars. Private domestic debt securities are calculated as the arithmetic mean in the current and the previous year. Based on the BIS IDS statistics.	http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database
Stock market capitalisation	Ratio of stock market capitalisation to GDP in per cent. Both measured in US dollars. Stock market capitalisation is measured as the arithmetic mean between the current and previous year of the market value of all listed stocks in a given market.	WB FDS dataset
Investment freedom index	Life insurance premium volume as a share of GDP (data from the Swiss Re Sigma).	WB FDS dataset

Comments on "Foreign banks and credit conditions in EMEs"

Glenn Hoggarth[1]

Summary

The definition and measurement of "foreign" credit in empirical analysis is often ambiguous, but it matters both for understanding the role of foreign credit flows in the domestic economy and the potential implications for policy.

This paper does a service by clearly defining and analysing the following four definitions of foreign credit as a share of total domestic plus cross-border bank credit:

(1) the narrowest one is credit from banks abroad lent directly to local companies and households (the real economy);

(2) a wider definition of foreign bank lending, often used in BIS papers, adds to measure 1 cross-border bank credit to domestic banks, including both locally headquartered banks and the affiliates of foreign headquartered banks, to fund, *inter alia*, their own lending to the domestic real economy;

(3) a broad measure of foreign-owned banks' direct credit to local companies and households (ie, direct cross-border bank credit (measure 1) plus an estimate of credit from local affiliates of foreign-owned banks), which is called "foreign participation" and is the main data innovation in the paper; and

(4) a definition based on the currency rather than bank ownership of "foreign" credit provided that includes foreign currency credit from domestic headquartered banks as well as from foreign headquartered ones.

These four measures of credit are often highly correlated – rising in many emerging market economies (EMEs) before the Great Financial Crisis (GFC) of 2007–09 and falling thereafter. That said, for most EMEs the foreign participation measure shows the largest foreign credit share depending on the extent to which foreign affiliates lend in local currency and are funded from domestic deposits rather than from abroad.

The main empirical results of the paper relate to the role of foreign credit in EMEs contributing to the increase in total bank credit (relative to GDP) to the real economy before 2008 and in causing a slowdown in GDP growth in the wake of the GFC. The authors find that differences in the growth of the share of direct cross-border bank credit (measure 1) play the most significant role in explaining differences in the growth of total credit to the domestic economy across EMEs in the 2002–08 period, and that differences in the share of direct cross-border credit at the outset of the crisis in 2008 explain differences in GDP growth afterwards (2008–10). However, credit from locally based foreign affiliates is found to temper the pre-crisis credit boom, and their turnaround was less evident than other measures of "foreign" credit in contributing to the post-crisis slowdown in growth. The authors attribute the latter

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[1]   Bank of England.

finding to foreign affiliates funding a lot of their local lending from local deposits that were a relatively stable form of financing pre- and post-GFC.

The second main contribution of the paper is that the authors go on to attempt to identify whether changes in foreign credit are driven by supply or demand factors. Supply falls if a particular foreign banking system reduces credit to all EMEs, whilst at the other extreme, "demand" falls if all foreign banking systems reduce their credit to one EME.[2] Using this approach, they find that in the wake of the GFC, many EMEs faced a reduction in supply from foreign banks, especially from European ones. Working in the other direction, the fall in the growth of foreign credit to China in recent years (2014–15) is interpreted mainly as a demand shock, since lending from foreign banking systems fell there more than in other EMEs.

Comment

The paper usefully highlights the role of different measures of foreign credit and especially the procyclical role played by cross-border credit. This is consistent with most previous empirical studies that show that bank lending is the most volatile form of capital inflows.[3] We have also found this pattern for advanced countries as well as for EMEs. Graph 1 shows that in the run-up to the GFC in countries where cross-border credit grew the most, so too did domestic credit. This combination was more likely associated with a financial crisis during the GFC highlighted by the red dots in the chart.

Growth of domestic credit and cumulative direct cross-border bank credit (end-2002–end-2007) and crisis incidence in the subsequent two years[1]   Graph 1
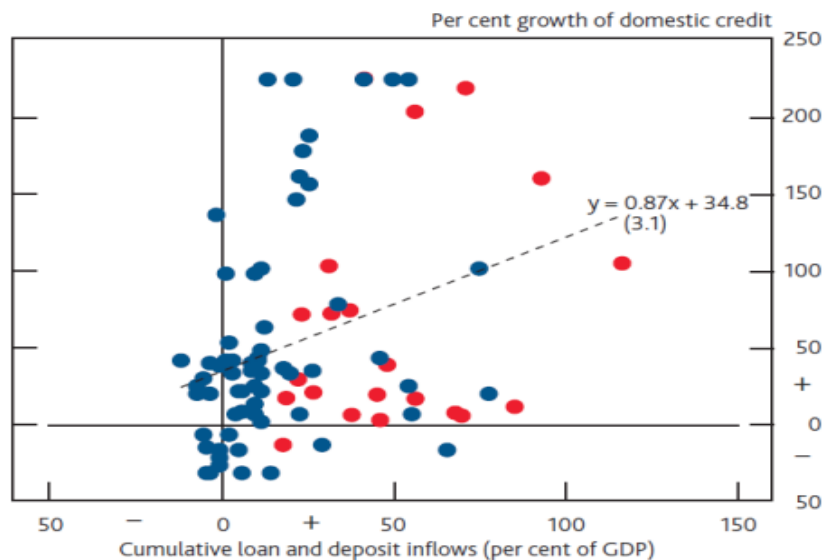
[1] A red dot indicates that the country experienced a banking crisis in 2008–10. A blue dot indicates no crisis. Data on banking crises were obtained from Laeven and Valencia (2013).

Source: Hoggarth et al (2016).

[2]   The term used in the paper is demand shock.

[3]   See, for example, Kose et al (2009) and Forbes and Warnock (2012).

One of the most interesting results in the paper is that where foreign affiliates accounted for a bigger share of credit to the real economy in EMEs, this tended to temper credit booms before the global crisis.

In future work, it would be useful to investigate this result in more detail. One approach would be to also explicitly include domestic credit from locally headquartered banks in the equations, so there is a direct comparison between foreign- and domestic-owned banks in contributing to domestic credit booms and the subsequent slowdown in GDP growth.

It would also be very useful to know whether the credit smoothing role found for foreign affiliates as a whole applies to both foreign subsidiaries and branches. This is important from a policy perspective given that the local regulator has more supervisory powers over foreign subsidiaries that are local legal entities than it does over foreign branches which are part of the foreign-headquartered banks.

In the United Kingdom, the growth in credit from foreign subsidiaries was much less cyclical than from foreign branches pre- and post-GFC (Graph 2; compare the green and mauve lines). In fact, the amplitude in the credit growth cycle from foreign branches was similar to that of direct cross-border bank credit. Similarly, recent studies of the US (Goulding and Nolle (2012)) and Italian (Albertazzi and Bottero (2013)) banking systems found that the domestic credit cycle was greater for foreign branches than for either domestic-owned banks or foreign subsidiaries.

Annual growth in bank lending to the UK private sector   Graph 2
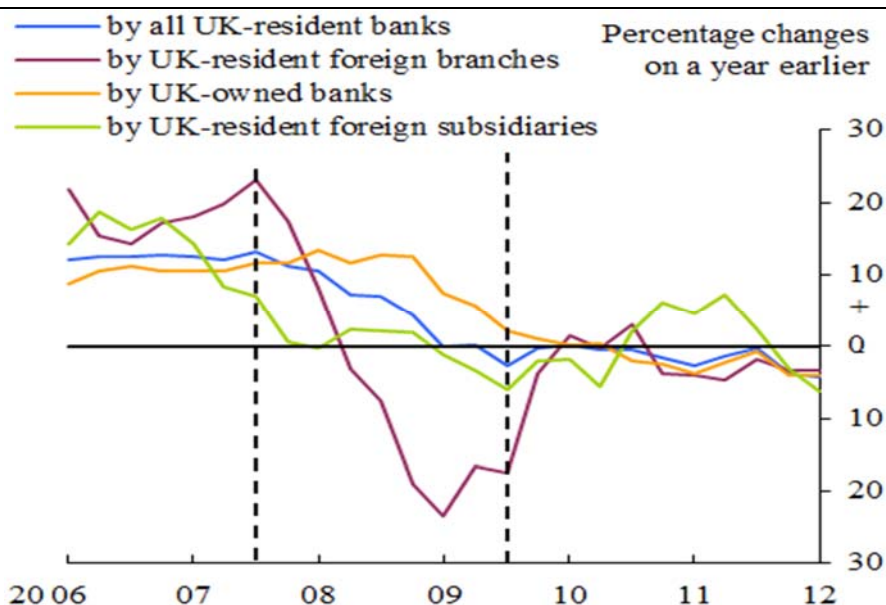
Source: Hoggarth et al (2013).

The sharp decline in credit to the UK domestic economy from foreign branches in the wake of the GFC was, we think, due to a combination of supply and demand factors. On the supply side, 70% of the liabilities of foreign branches were from abroad, especially from banks, particularly from the parent bank. In contrast, three-quarters of funding of foreign subsidiaries was from domestic deposits. Given that the centre of the crisis was the international banking system rather than domestic households and companies, wholesale funding was less stable than retail funding.

Also, on the demand side, most domestic lending in the United Kingdom by foreign branches was to the financial sector rather than to domestic companies and especially households.

On the identification of credit supply versus demand, the latter should be regarded as a country-specific shock since it affects lending by foreign banking systems to a specific EME borrower. This could capture a range of "pull" factors rather than necessarily a change in demand for credit from an EME's final households and corporates. That said, as a check on the identification of (country-specific) credit demand versus (banking system-specific) supply, it would be useful to compare the pattern of credit growth from foreign banks with credit from international bond markets. If there was a foreign bank credit supply shock, then there would be an expected negative correlation with credit from banks and from market finance as non-bank financial institutions stepped in and took up the unsatisfied demand. On the other hand, if there was a country-specific shock, then credit would also be expected to fall from these other foreign lenders.

Another reason to expand the analysis to foreign debt market finance is that portfolio debt flows to EMEs have become more important since the GFC, especially when including the debt issued abroad by the affiliates of EME-headquartered companies (see, for example, McCauley et al (2015)).

Usually cross-border bank credit to EMEs is thought to be volatile and thus pose domestic funding risks. This is confirmed by the results in this paper. However, the balance sheet risk may be bigger with portfolio debt since nearly all this debt is in foreign currency, whereas cross-border bank credit has increasingly been provided in domestic currency. Moreover, portfolio debt is mainly issued to global institutional investors, which tend to be less regulated than international banks.

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Household credit in Asia-Pacific[1]

Moritz Schularick[2] and Ilhyock Shim[3]

Abstract

Household credit in Asia-Pacific has grown strongly over the past two decades. Managing household credit booms and their financial stability implications has become a central task for policymakers. In this article, we assess the effects of changes in interest rates and macroprudential measures on various types of credit growth. We find that changes in monetary conditions reduce growth in household and housing credit over a two-year horizon. Macroprudential measures also significantly slow the growth of various credit aggregates. More precisely, we find that general bank credit tightening actions, such as increases in reserve requirements, reduce credit growth over one to four years, while housing credit tightening actions such as higher loan-to-value ratios are effective only on housing credit over one to two years.

Keywords: Credit growth, financial stability, monetary policy, macroprudential policy.

JEL classification codes: E01, E44, E58.

1. Introduction

The dangers of credit cycles and pronounced increases in economy-wide leverage have become apparent in the global financial crisis. In particular, household balance sheets and the dangers of credit-fuelled housing cycles have emerged as a priority in macroeconomic research (Mian and Sufi (2014) and Jordà, Schularick and Taylor (2016)). Central banks across the world are confronted with the task of maintaining financial stability by managing credit cycles and achieving other economic objectives simultaneously.

This warrants new thinking and potentially new tools that are yet to be tested. How can credit booms be effectively managed? What are the trade-offs, if any, between achieving financial stability and stabilising inflation and output? The debate about the efficacy of various policy tools has been very active in recent years (Stein (2013), Williams (2014) and Svensson (2015)). This paper contributes to this debate by studying the experience of Asia-Pacific economies over the past two decades.

We aim to assess the effects of changes in interest rates and various types of macroprudential policy action on credit growth in Asia and the Pacific from 1990 to 2014. Among different types of credit, we focus on household credit, housing credit and consumer (ie non-housing) credit, and also consider total bank credit to the private non-financial sector. In terms of econometric methods, we use the trilemma instrumental variable (IV) as in Jordà, Schularick and Taylor (2015) to identify exogenous changes in the interest rates of Asia-Pacific economies. We also use inverse propensity weight regression adjusted (IPWRA) estimators as in Jordà, Schularick and Taylor (2016) to address the endogeneity of macroprudential actions.

The main results of the paper are the following. First, both changes in the domestic policy rate and changes in the domestic policy rate instrumented by the US policy rate significantly reduce growth in household credit and housing credit by up to 2 percentage points over two years. The IV estimates confirm these estimates and point to somewhat stronger effects, which indicates that there is some attenuation bias in the naive estimations and that the actual effects of monetary policy are stronger.

Second, we find that general credit-targeted policies have larger effects on household credit than do housing credit-targeted policies. In particular, when we run OLS regressions to gauge the impact of general bank credit-targeted non-interest rate monetary policy actions, we find that the growth in all four types of credit (total bank credit to the private non-financial sector, household credit, housing credit and consumer credit) significantly slows over the next two to six quarters, with the strongest impact on total bank credit and the longest impact on household credit.

Third, when we try to mitigate endogeneity bias by using inverse propensity weights, we confirm that macroprudential policies are successful in slowing down the pace of credit growth. In particular, when we gauge the effect of macroprudential measures with inverse propensity-weighted local projections, we find that macroprudential measures remain statistically and economically more significant for a generally longer period on all four types of credit.

The structure of the paper is as follows. We first introduce data in Section 2. In Section 3, we present stylised facts for household credit growth in Asia and the Pacific in the past two decades. Section 4 then briefly introduces the methods used to

determine the effects of policy interventions. Section 5 shows how changes in interest rates and macroprudential polices affect credit growth. The final section concludes.

2. Data

The data used in this paper rely on various sources such as the BIS Databank for various bank credit series and the database on macroprudential policy actions in Shim et al (2013). In addition to the usual macroeconomic variables for Asia-Pacific economies, the paper also uses structural variables such as capital account openness and the degree of currency peg, as well as crisis dummies. All data are quarterly frequency from 1990Q1 to 2014Q4. The Asia-Pacific economies in the sample are the following 12 economies: Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

For dependent variables, we use various credit variables. In particular, we use data from the BIS Databank on bank credit to the private non-financial sector, household credit, housing credit and consumer credit (ie, non-housing household credit). We can also define corporate credit as the difference between bank credit to the private non-financial sector and household credit.

Explanatory variables include policy variables, other macroeconomic variables, asset prices, crisis dummies and structural variables. For policy rates, we use actual policy rates, backdated with one-month or three-month market interest rates obtained from the BIS Databank. For the US policy rate, we use the federal funds rate obtained from Bloomberg.

For macroprudential policy actions, we use the database for policy actions on housing markets constructed by Shim et al (2013). In particular, this paper uses the following two aggregated indicators of policy actions: (1) total bank credit-targeted measures, which is the sum of changes in reserve requirements, changes in liquidity requirements and credit growth limits; and (2) housing credit-targeted measures, which is the sum of LTV limits, DSTI limits, risk weights on housing loans, provisioning requirements and exposure limits on the property sector. When one tightening action of a category is taken within a quarter, the indicator variable takes value +1; when two loosening actions are taken within a quarter, it takes value –2; and when no action is taken in a given quarter, it takes value zero. Table 1 summarises the total number of total bank credit-targeted measures taken by the 12 Asia-Pacific economies over 1990–2013.

For other macro variables, data on gross capital formation as a percentage of GDP and per capital GDP are from the IMF WEO database, while data on current account balance over GDP are from the BIS Databank. Among the two asset prices used in the paper, equity prices are from the BIS Databank, and house prices from the BIS property price statistics. For crisis dummies, we use the banking crisis dummy and the currency crisis dummy obtained from Laeven and Valencia (2012).

Finally, we use two structural variables to construct a trilemma IV for domestic policy rate variables. To determine whether an economy's currency is pegged to the US dollar, we use an updated version of the Shambaugh (2004) de facto exchange rate classification data set and construct a dummy variable (PEG) taking value 1 when a country's currency is pegged or soft-pegged and value zero otherwise. To measure capital account openness, we use the updated Chinn-Ito (2008) index, normalised to

range between zero (least financially open) and 1 (most financially open) for our sample from 1990 to 2013 (KOPEN).

Macroprudential policy actions taken by Asia-Pacific economies, 1990–2013 Table 1

Economy	Monetary actions		Prudential actions		All macroprudential actions	
	Tightening	Loosening	Tightening	Loosening	Tightening	Loosening
Australia	–	–	2	–	2	–
China	35	9	23	2	58	11
Hong Kong SAR	1	–	15	6	16	6
India	18	17	11	2	27	17
Indonesia	3	1	1	–	4	1
Japan	1	2	–	–	1	2
Korea	2	3	20	6	22	9
Malaysia	12	7	6	4	18	11
New Zealand	3	–	1	-	4	–
Philippines	19	27	5	4	20	27
Singapore	–	–	12	2	12	2
Thailand	1	2	4	1	5	3
Total	95	68	100	27	189	89

Sources: Shim et al (2013); authors' calculations.

3. Household credit trends in Asia and the Pacific

In this section, we briefly describe the main trends with respect to the evolution of household credit in Asia-Pacific over the past two decades. Moreover, we ask whether the household credit cycle in Asia-Pacific has become more integrated over time.

3.1. Aggregate trends

In the past two decades, the volume of bank lending to the household sector in Asia-Pacific has grown substantially relative to output, as shown in Figure 1. Total bank credit to the household sector more than doubled relative to GDP between 1995 and 2015. This increase is likely to be a lower bound estimate as credit creation by the shadow banking system is excluded from our banking sector data.

What has been driving the growth of household credit in Asia? Figure 1 tracks the evolution of household, mortgage and consumer (ie non-mortgage) lending by banks relative to GDP. The series depicts the time effects across the countries in the sample. The graph demonstrates that mortgage borrowing has accelerated markedly. This trend is observed in almost all individual economies. Mortgage lending to households accounts for the lion's share of the rise in credit to GDP ratios, as shown in Figure 2. This is in line with the advanced economy evidence presented in Jordà, Schularick and Taylor (2016). Household credit has grown strongly, mainly driven by the mortgage component of credit. However, in some countries such as Indonesia and Thailand, consumer credit has also shown considerable growth.

Household credit in Asia-Pacific   Figure 1

Mortgage credit vs consumer credit as a ratio to GDP   Figure 2
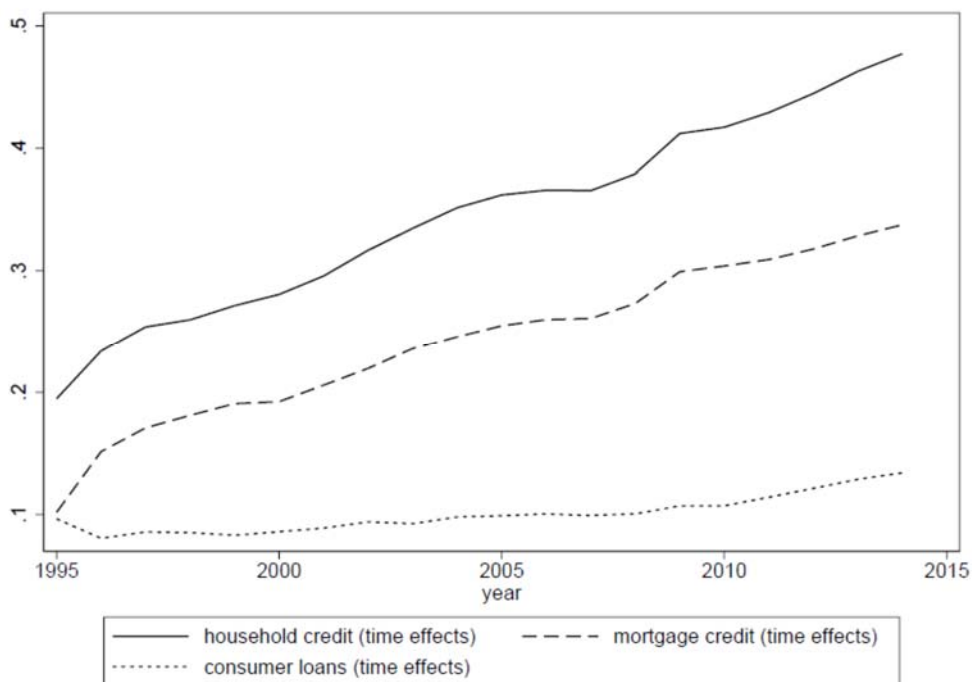
3.2. Country trends

There is considerable cross-country heterogeneity in the data. Figure 2 shows the development of two subcategories of household credit extended by banks – mortgage lending and (unsecured) consumer lending since the 1990s.

Table 2 decomposes on a country level the increase in total bank lending-to-GDP ratios. In particular, we can decompose the change in the ratio of total bank lending to GDP into the change in the ratio of household lending to GDP and the change in the ratio of corporate lending to GDP. In turn, the change in the ratio of household lending to GDP can be divided into that in the housing lending-to-GDP ratio and that in the consumer lending-to-GDP ratio. On average, increases in household lending contribute about 70% of increases in total bank lending, and increases in housing lending account for 78% of increases in household lending. In most countries, housing credit increased more than consumer credit. However, in Indonesia and Thailand, consumer loans increased more than housing loans.

Change in the ratio of bank lending to GDP from 1994 (or earliest available) to 2014   Table 2

Economy	Starting date	(1) Total bank loans	(2) Household loans	(3) Housing loans	(4) Consumer loans	(5) Corporate loans
Australia	1994Q4	0.71	0.55	0.54	0.01	0.16
China	1997Q4	0.43	0.23	0.16	0.07	0.20
Hong Kong SAR	1994Q4	0.86	0.27	0.17	0.10	0.60
India	1998Q4	0.30	0.06	0.04	0.03	0.24
Indonesia	1996Q4	–0.12	0.05	0.00	0.05	–0.17
Japan	1994Q4	–0.02	0.10	0.14	–0.05	–0.12
Korea	1996Q4	0.17	0.30	0.17	0.13	–0.13
Malaysia	2006Q4	0.20	0.16	0.14	0.01	0.04
New Zealand	1998Q4	0.50	0.33	0.33	0.00	0.17
Philippines	1994Q4	0.10	0.02	0.01	0.01	0.08
Singapore	2004Q4	0.28	0.16	0.16	–0.01	0.13
Thailand	2003Q4	0.16	0.29	0.08	0.21	–0.13
Average	–	0.30	0.21	0.16	0.05	0.09
Fraction of average	–	1.00	0.703	0.546	0.157	0.297

3.3. Cross-country correlation of credit cycles

Another way of studying these trends is to look at the cross-country correlation of credit growth rates in Asia-Pacific economies. Have greater financial openness and real economic integration led to more synchronised financial cycles across the region? Standard economic theory makes diverging predictions with respect to positive or negative international co-movement of financial variables.

A basic international real business cycle framework suggests a negative co-movement as a domestic total factor productivity shock increases the marginal product

of capital at home, leading to a temporary expansion there. At the same time, the foreign country contracts as world interest rates are pushed up by the home country's increased financing demand (Kollmann (1996) and Mendoza et al (2009)). In contrast, international macro models featuring bank intermediation can generate positive co-movement in international financial cycles. Kollmann et al (2011), for instance, present a model in which the negative co-movement inherent in international RBC models is supplemented by the synchronising forces of a global bank. Responding to a credit loss in one country, the global bank increases the loan-deposit spread in both countries to replenish its capital and thereby induces an internationally synchronised contraction.

The risk-taking channel of currency appreciation[4] can also generate positive correlation (Bruno and Shin (2015a and 2015b)). Our approach here will be to look at the evolution of the correlation between credit cycles in Asia-Pacific economies over predefined windows of 12, 18 and 24 quarters. We detrend the real household credit-to-GDP ratio using a HP filter. In this process, it is important to take into consideration that we have an unbalanced panel. That is, the household credit series is quite short for some economies, so the correlation for early years (eg in the 1990s) has a smaller number of countries than later years (eg in the 2010s). Even though capital account openness differs across countries (eg China and India have very low openness) and household credit booms are often driven by country-specific (ie idiosyncratic) financial development or financial liberalisation initiatives, Figure 3 shows that the average correlation has been increasing over the past 10 years or so. This suggests that a common global factor may have played a more and more important role over time.

Average rolling correlations of credit growth   Figure 3

4. Empirical methods

The goal of this paper is to assess the impact of monetary and macroprudential policy measures on credit growth. In this section, we briefly explain the methods we use to estimate the impact of these measures on credit variables. We will first test how changes in monetary conditions affect credit growth, before looking at the response of credit aggregates to macroprudential measures. We rely on the database of macroprudential measures developed by Shim et al (2013), and extend it to include observations from July 2012 to December 2013.

4.1. Local projections

Our empirical strategy to assess the impact of changes in monetary conditions on household credit relies on the local projection approach developed by Jordà (2005).

Let $\Delta_h y_{it-1} = y_{it+h} - y_{it-1}$ denote the response variable of interest, for example, the change in the credit-to-GDP ratio from the base quarter $t-1$ up to quarter $t+h$ with $h = 0,1,\ldots,H$. The subindex i denotes the country. Let Δr_{it} denote the change in any variable whose perturbations we want to trace.

Next, consider two additional vectors of variables. The vector ΔW_{it} includes all the variables in the system observed at time t for country i. We are interested in estimating the dynamic multipliers of $\Delta_h y_{it-1}$ for $h = 0,1,\ldots,H$ to an exogenous perturbation in Δr_{it}. Identification of this exogenous perturbation can be achieved by using a rich set of controls to isolate the selection mechanism based on observables. This is done via the auxiliary vectors ΔW_{it} and ΔX_{it-1}. Specifically, notice that the vector ΔW_{it} has the same timing as Δr_{it}.

Using these variable definitions, the specification of the local projections is

$$\Delta_h y_{it-1} = \alpha_i^h + \beta^h \Delta r_{it} + \Delta W_{it} \Gamma^h + \Delta X_{it-1} \Phi^h + u_{it+h}. \tag{1}$$

The α_i^h is country-fixed effects, and in the estimations below we use country-based cluster-robust standard errors. We will show the results of the standard OLS estimates of expression (1) with the instrumental variable approach discussed below to characterise the bias in the OLS estimates.

4.2. Instrumental variable local projections

The second basis for identification uses the instrumental variable z_{it} for Δr_{it} to account for selection based on unobservable factors. The equation can also be estimated by instrumental variables regression methods using z_{it} as the additional instrument for Δr_{it}. The dynamic multipliers of interest are the IV estimates of β^h for $h = 0,1,\ldots,H$. We generically designate these as LP-IV coefficients, short for *local projection instrumental variables*.

To opt for an exchange rate peg means to sacrifice monetary policy autonomy, at least to some degree. Following Jordà, Schularick and Taylor (2015), we exploit this fact to isolate fluctuations in the short-term interest rate that are not explained by home economic conditions, but are driven by the base country and hence exogenous. We treat the term $z_{it} = [PEG_{it} \times KOPEN_{it} \times \Delta r_{it}^*]$ on the right-hand side of equation (1) as an exogenous influence on local monetary conditions in the home economy, notwithstanding other effects captured by the rest of the terms in the

equation. Thus z_{it} will serve in what follows as the instrumental variable for changes in home interest rates, and will permit us to identify causal influences of monetary conditions on credit conditions.

4.3. Synthetic control methods

We are also interested in the effects of macroprudential measures and aim to compare them with interest rates as a tool to manage the credit cycle. We are thus confronted with the problem that macroprudential policy measures are not taken at random. To achieve identification we not only rely on the rich set of economic controls discussed above, but also use synthetic control methods developed in previous work. The exposition here closely follows Jordà, Schularick and Taylor (2015). Building on a large literature in biostatistics and more recently in econometrics, Angrist, Jordà, and Kuersteiner (2013) propose a novel inverse probability-weighted (IPW) estimator. The estimation procedure consists of two stages. In the first stage, a model is constructed to determine the probability that the policy measure is taken: $p(d_\tau = 1|\{Y_{\tau-l}\}_{l=0}^L)$. Here Y_τ denotes a vector of lagged observable macroeconomic controls observed up to L periods before the policy action is taken. This probability will be called the *propensity score* and we denote its estimate as $\hat{p}_\tau$. The propensity score model will be estimated using a logit estimator.

The second stage consists of running the local projections using weights given by the inverse of the propensity score in each bin. Weighting by the inverse of the propensity score puts more weight on those observations that were difficult to predict. These observations come closest to the random allocation ideal and hence receive more weight than those instances in which the observation was endogenous due to the other factors. Because it compensates for unknown non-linearities, the inverse probability weighting can be seen as a more flexible mechanism to control for the role of observables compared with controlling only through the conditional mean:

$$\Lambda^h = \sum_{d_\tau=1} \frac{\Delta_h y_{\tau+h}}{\hat{p}_\tau} - \sum_{d_\tau=0} \frac{\Delta_h y_{\tau+h}}{1-\hat{p}_\tau}. \tag{2}$$

Alternatively, we know that expression (2) can be recast as a simple regression estimate

$$\Delta_h y_{it+h} = \theta_n^h + \Lambda^h d_t + \epsilon_{\tau+h}. \tag{3}$$

Hence the counterparts to $\hat{\theta}_n^h$ and $\hat{\theta}_f^h$ in expression (3) can be directly obtained by noting that $\hat{\theta}_f^h = \hat{\theta}_n^h + \hat{\Lambda}^h$. In order to implement IPW in expression (2) all that is needed is to estimate expression (3) using weighted least-squares (WLS) with weights defined by $\omega_\tau = \frac{d_\tau}{\hat{p}_\tau} + \frac{1-d_\tau}{1-\hat{p}_\tau}$. A natural extension to expression (3) is to include controls $\{Y_{\tau-l}\}_{l=0}^L$ directly in the regression estimator as well, such as in Jordà and Taylor (2016). The WLS estimation of this extended regression is an example of a "doubly robust" method (eg Lunceford and Davidian (2004), Wooldridge (2010) and Glynn and Quinn (2010)). It is called *doubly robust* because we control for observables via two channels: first, directly in the regression; and second, indirectly through the propensity score. Only one of these two channels need be properly specified to produce consistent estimates. Further details can be found in Jordà, Schularick and Taylor (2016).

5. Empirical results

The first set of questions we ask includes the following: how does (household) credit growth respond to changes in monetary conditions? What is the impact of, say, a 100 basis point increase in interest rates on household credit growth over the following years? Moreover, do we observe differential responses of different credit components so that some subcomponents of household credit respond more strongly than others? Our strategy will be the following. We begin studying the effects of monetary policy before moving on to macroprudential policy. We will start with standard OLS estimates, but complement them with instrumental variable estimation in the case of monetary policy, and inverse propensity weighted local projections in the case of macroprudential measures. Going in both cases from the simple OLS to the IV/IPW estimates will also allow us to quantify the bias of relying on simple OLS estimates.

5.1. Monetary policy

We begin by reporting results for two impulse variables: domestic policy change and the domestic policy change instrumented by US policy rate change under pegged exchange rates relying on the trilemma IV.

5.1.1. OLS estimates

The OLS estimates of a 100 basis point increase in domestic policy rates are shown in Figure 4. The local projections suggest an impact of monetary policy on credit aggregates, albeit a mild one in the case of household credit. As a benchmark estimate, the mortgage credit to GDP ratio falls by about half a percent over two years following a 100 basis point increase in policy rates, while total household credit falls by close to 1% after two years. It appears that the domestic policy rate has a stronger effect on total bank credit through its impact on business credit. Here, the effect of a 100 basis point policy rate increase accumulates to about 3% after four years. Figure 4 also shows that most of these effects are small but statistically significant.

Effects of domestic policy change   Figure 4
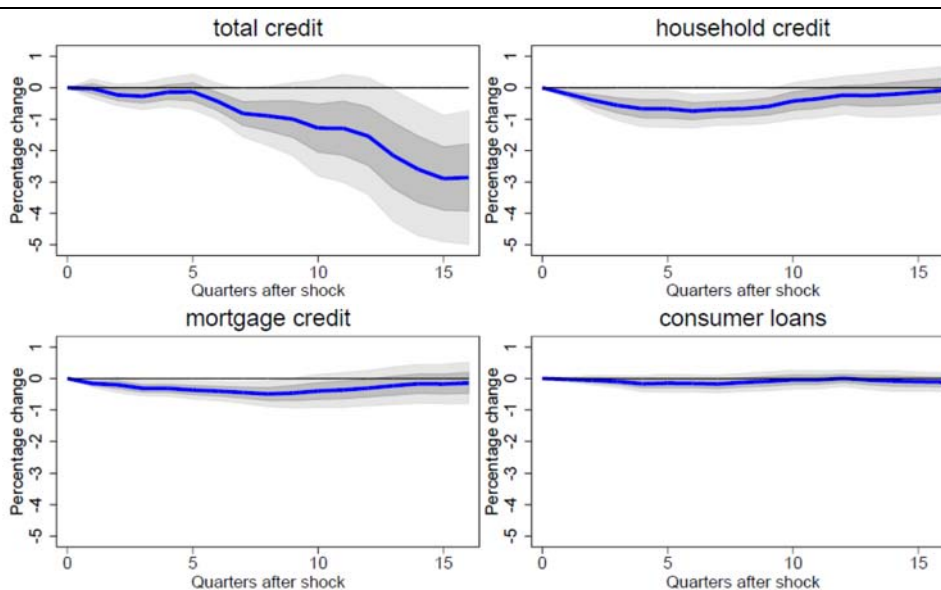
5.1.2. IV estimates

However, there are good reasons to suspect that simple OLS estimates are biased. Policymakers don't take policy at random, violating the random assignment assumption of the treatment. As explained above, we therefore turn to instrumental variable local projections, exploiting the well known macroeconomic trilemma. Countries that peg (de facto or de jure) their exchange rate under relatively open capital accounts are forced to import the monetary policy of the base country. In our IV estimates, we therefore only use the variation in monetary policy that is due to changes in base country interest rates. A necessary but defensible assumption here is that base country policymakers do not pay attention to economic conditions in the pegging country.

The IV estimates are displayed in Figure 5. Overall, the IV estimates reinforce the previous estimates, implicitly pointing to some attenuation bias in the OLS estimates. In particular, the effect of changes in monetary conditions on mortgage credit strengthens and cumulates to 1.66% after two years. Moreover, the effects are precisely estimated and significant over virtually all quarters in the first two years. Consumer credit tends to be negatively impacted by higher interest rates, but the effects are rather small economically and insignificant both in the OLS local projections and in the instrumental variable regressions.

Effects of IV   Figure 5
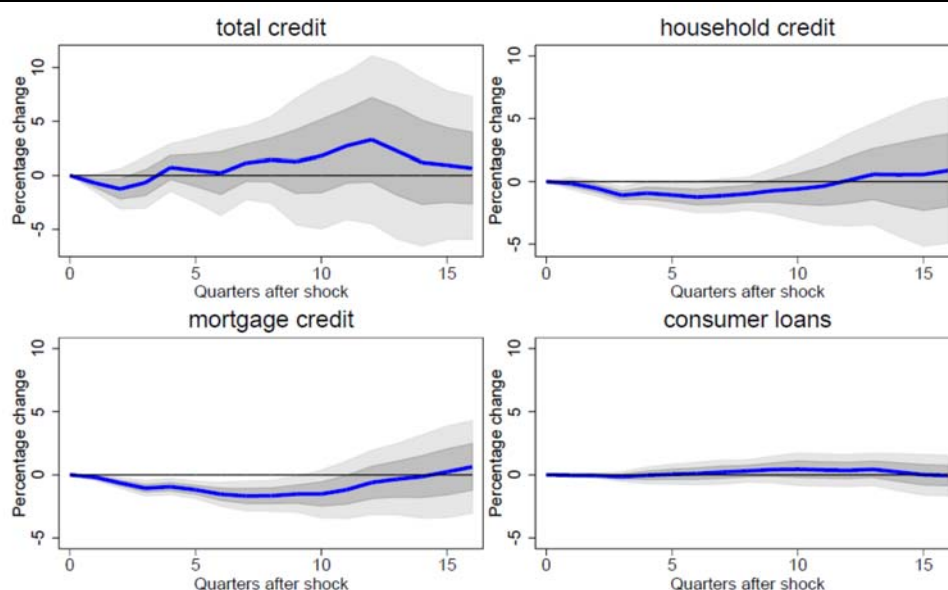
5.2. Macroprudential measures

In this section, we compare the effects of interest rate changes with other policy action by central banks, namely macroprudential measures. We first look at the effects in a simple event study format, controlling for observables. In a second step, we make use of synthetic control methods to tease out causal effects.

Moreover, we differentiate between two types of macroprudential policy tools. Our first variable covers tightening measures targeting housing credit. It codes all housing credit-targeted measures as the sum of LTV limits, DSTI limits, risk weights on housing loans, provisioning requirements and exposure limits on the property

sector. The second variable relates to more general non-interest rate monetary policy actions targeting general bank credit, defined as the sum of changes in reserve requirements, changes in liquidity requirements and credit growth limits.

5.2.1. OLS event study

The OLS estimates of a macroprudential tightening measures targeting housing credit are shown in Figure 6. Figure 7 highlights the effects of non-interest rate monetary policy actions targeting general bank credit.

Effects of housing credit measures   Figure 6
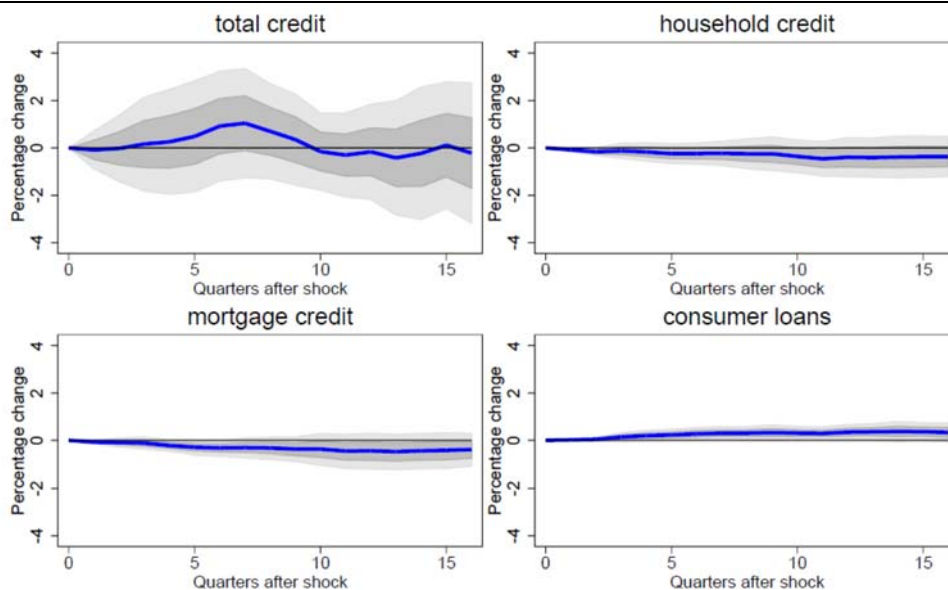
Effects of general credit measures   Figure 7
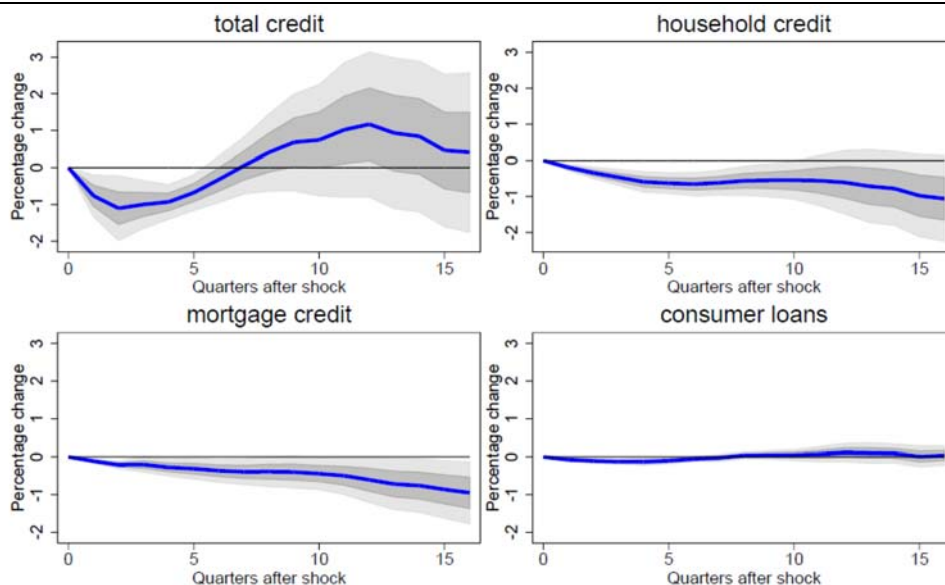
Two results in particular stand out. First, macroprudential measures appear to put a break on credit growth, but the effects are relatively small. Second, at least in our sample of Asia-Pacific economies, it appears that macroprudential measures targeting the housing market only are less effective than measures such as higher reserve requirements that affect all kinds of credit.

In additional, we find statistically significant but economically weak evidence that housing credit policies increase consumer loans after one year. This finding suggests that housing credit-targeted prudential policies may generate leakages from housing credit to consumer credit.

5.2.2. Local projections using inverse propensity weights

We now turn to the local projection estimates using inverse propensity weights (IPW). We will compare them with the OLS estimates above to gauge to what extent the synthetic control strategy alters the "naive" OLS estimates. Figure 8 shows the effects of housing credit restrictions, while Figure 9 shows the effects of general credit restrictions. In both cases, we estimate fixed effects panel regressions using inverse propensity weights obtained from a first stage panel probabilistic model, where the dependent variable is an indicator variable for a macroprudential measure taken by the authorities at time t. We estimate the probability that the authorities take a macroprudential action using the following log-odds model:

$$
log \left(\frac{Pr(S_{it} = 1 | X_{it})}{Pr(S_{it} = 0 | X_{it})} \right) = \alpha_i + \beta X_{it} + \epsilon_{it}. \tag{4}
$$

Effects of housing credit measures (IPW)   Figure 8
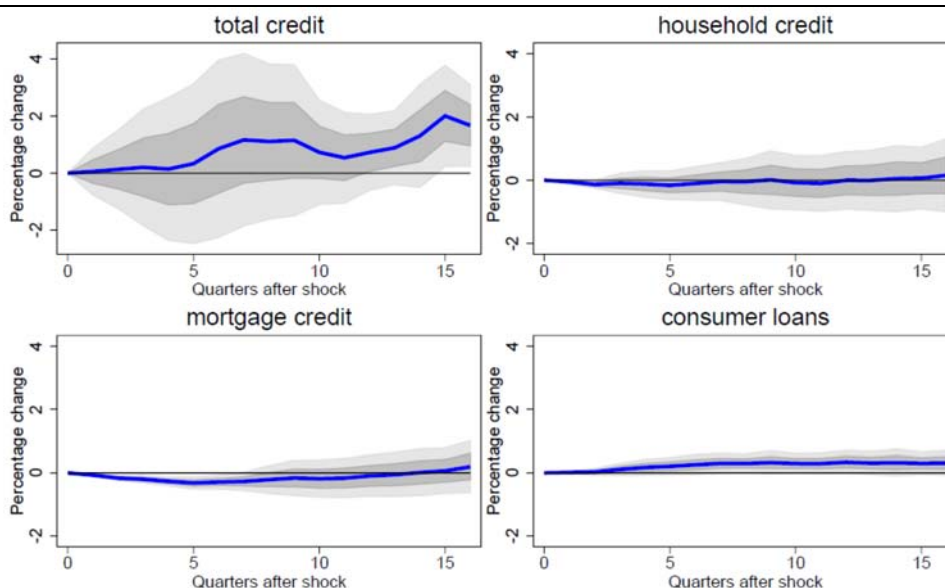
X_{it} contains four lags of the growth rates of credit to GDP, real GDP growth, asset prices and inflation. To soak up country heterogeneity we will include a country fixed effect α_i for each of the countries. We then use the time-varying probabilities of macroprudential measures being taken to weigh observations in the local projections. The lower the probability, the bigger the weight of the observation in the weighted least squares regression as the "unpredictable" actions come closest to the random allocation ideal.
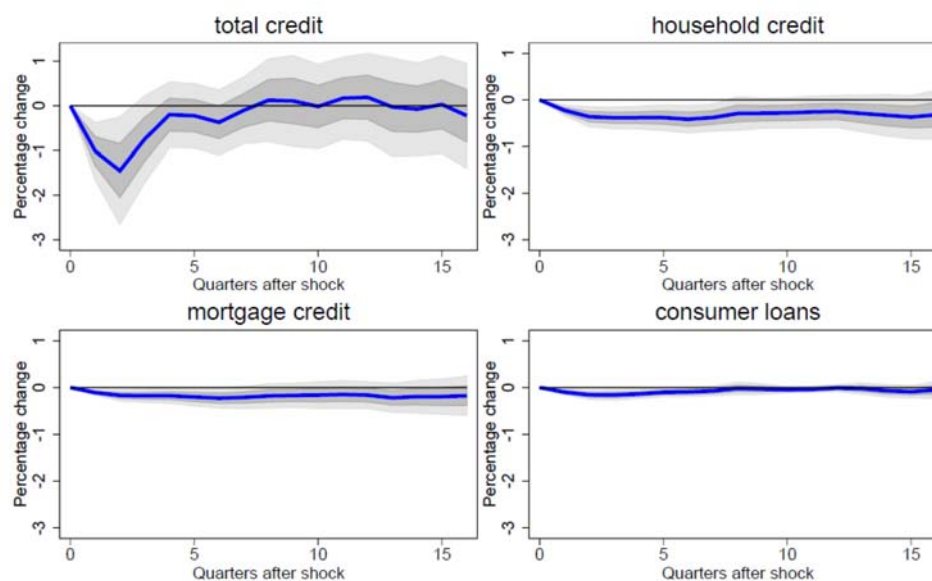
Figure 8 shows the effects of housing market lending restrictions estimated using inverse propensity weights, while Figure 9 tracks the response of the credit aggregates to general credit measures.

The results confirm a small but, certainly in the case of general credit measures, significant impact of macroprudential actions on the credit cycle. However, in particular in the case of general credit measures, the estimated effects appear a little smaller once we use synthetic control group measures. Finally, similar to when we run simple OLS regressions, we find weak evidence that consumer credit increases after housing credit policies are tightened.

Overall, we conclude that macroprudential measures appear to have slowed down the credit cycle in the Asian economies under study here. The main economic effects – essentially a stabilisation of the credit-to-GDP ratio over a two-year period – do not appear to be extremely pronounced, but can play a role in controlling the build-up of financial imbalances.

6. Conclusion

In this paper, we ask how central banks can manage the household credit cycle and which types of policy action hold more promise than others. We find that general credit-targeted policies have larger effects on household credit than housing credit policies, that there is evidence that housing credit policies generate leakages from housing credit to consumer credit, and that mitigation of attenuation bias by using IV estimates of domestic policy rates reveals stronger policy effects than domestic policy rates themselves.

There are numerous areas for further research. First, in this paper, we used the US policy rate as an instrument for domestic policy rates if an economy's capital account is open and its exchange rate is pegged, and tested the transmission channel from monetary policy to household credit using local projections. Alternatively, we

could feed Romer and Romer (2004) policy shocks into local projections and consider their impact on credit growth. Second, this paper only considers 12 Asia-Pacific economies, including both advanced economies and emerging market economies (EMEs). Second, we can extend the analysis to non-Asia-Pacific economies to the extent that data on household, housing and consumer credit are available. We have relatively long household credit series for most advanced economies in Europe and North America. Among non-Asian EMEs, we found that we could consider at least nine more EMEs in central and eastern Europe and Latin America.

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Comments on "Household credit in Asia-Pacific"

Woon-Gyu Choi[1]

Introduction

Mounting household (HH) debt raises concerns about financial vulnerability. In recent years, HH credit in Asia has grown fast, posing challenges to policymakers. This is also because the resulting "excessive" HH debt could adversely affect consumption or output after it reaches a tipping point. To stabilise high HH debt economies, policymakers would need to move ahead of the curve and introduce a good mix of monetary and macroprudential policies.

Against this backdrop, the paper by Moritz Schularick and Ilhyock Shim timely examines differential impacts of monetary policy and macroprudential policy on credit growth in 12 Asian economies – extending the database for macroprudential measures by Shim et al (2013). With sharp methodological ingredients, the paper estimates those policy impacts using instrumentals for domestic interest rate changes and an inverse-probability-weighted (IPW) estimator as well as a local projection approach.

The paper sheds light on the regional terrain of HH credit growth and policy options for macro-financial stability. The paper provides the following two points associated with the deployment of macroprudential policy and its harmonisation with the conduct of monetary policy. First, it shows evidence that general bank credit tightening is more effective than housing credit tightening in curbing household credit growth. Second, it provides a case for policy complementarity. Macroprudential policy has a significant effect on credit growth but no discernible one on output and inflation. In contrast, monetary policy has a significant effect on both the financial and real fronts. These findings could have important implications for a policy mix, which I will discuss later in my remarks.

General comments

Let me first make general comments and pose some questions as follows. The private credit-to-GDP ratio is a well known metric of financial imbalance. Are there concerns about financial imbalances in the private sector of Asian economies? How are credit expansions translated into mounting HH debt? How can prudential measures be deployed to temper HH credit growth? Does aiming at a narrow target on "bank" credit call for a balloon effect? Does cumulative credit growth matter for consumption and income? If there is complementarity between monetary policy and macroprudential policy, how can the two policies be reconciled in the era of low inflation and low growth?

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The data on credit to the private sector in 12 Asian countries show that the private credit-to-GDP ratio has on average stabilised in recent years but still remains higher than the pre-Global Financial Crisis (GFC) level in some countries (Figure 1). Noting that a higher ratio reflects financial deepening and/or credit excess (after a tipping point), Hong Kong SAR, Australia, New Zealand, Korea and Japan are above the group average (orange line); Malaysia, Thailand, China, and Singapore are around the average; and India, the Philippines and Indonesia are below the ratio of 1.0. Figure 2 shows changes in the private credit-to-GDP ratio (as a fraction) after the GFC. Many countries saw an increase in the ratio during the GFC (red dots in chart) and then pulled it down below the pre-crisis level (blue ticks), but Australia (0.22), Korea (0.23), and New Zealand (0.17) remain above the pre-GFC level.

Credit to the private sector (12 Asian economies)   Figure 1
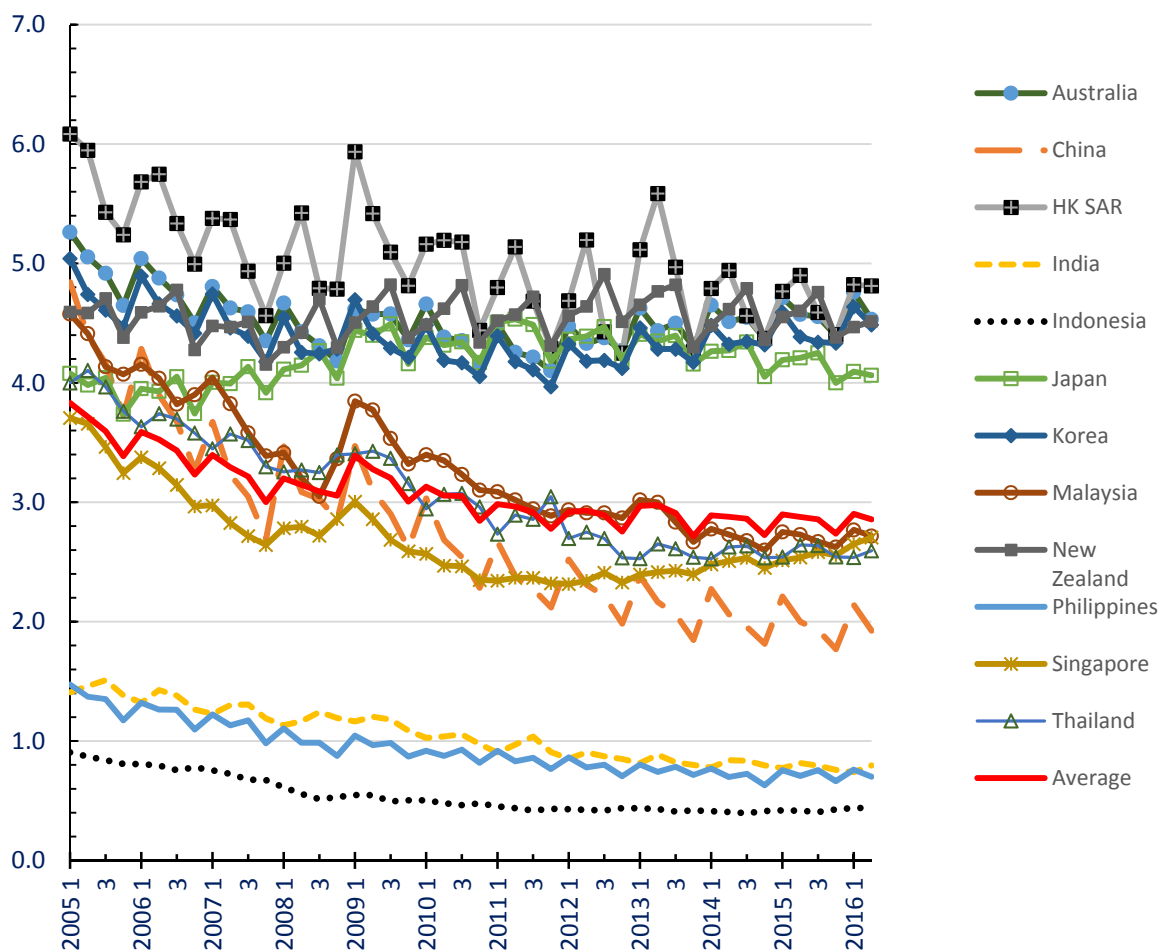
Note: Quarterly data for 2005Q1–2016Q2 are not seasonally adjusted.

Source: Haver Analytics.
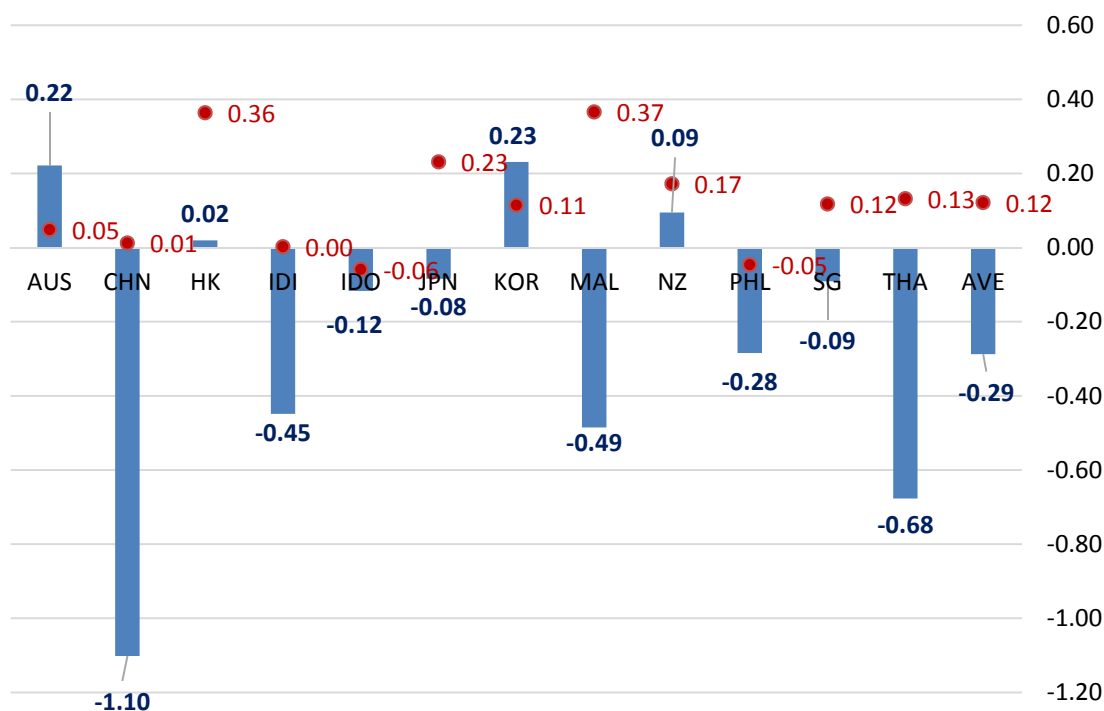
Note: Red dots represent changes in the one-year average of the private credit-to-GDP ratio (in fraction) before (2007Q4–2008Q3) and after the GFC (2008Q4–2009Q3).

In contrast to stabilising private credit relative to GDP in Asia, HH credit relative to GDP in Asia overall has been rising, as shown by the paper's Figure 1. As a result, HH debts (relative to GDP) have grown rapidly in many countries (Figure 3). This contrast poses a question associated with the drivers or sources of private credit evolutions. Specifically, I wonder if the private credit share has shifted from firms to HHs. Understanding their evolution will help address how much, and how to, deploy prudential measures (Figure 4).

As regards the coverage of credit management, the paper finds that "general bank" credit tightening is more effective than "housing" credit tightening, supporting a broader coverage in targeting credit. A balloon effect suggests needs for the comprehensive management of credit: in the case of Korea (Figure 5A), tightening bank loans to HHs may call for a balloon effect on HH credit through non-bank depository or other financial corporations, not subject to (bank-based) macroprudential measures. This may lead to the unintended consequence of shifting credit risk to shadow banking. I also would like to note that the credit terrain paints different pictures for different countries. The balloon effect may depend on institutional structure: in the case of Thailand (Figure 5B), loans to HH show different dynamics across lender types and have been stabilised in recent years.

There could be non-linearity in the effects of HH debt on consumption and income. Previous studies (eg Cecchetti, Mohanty, and Zampolli (2011)) suggest that excessive debt has adverse effects on the real front through increased future debt-service burdens. It is also notable that a tipping point beyond which HH debt constrains consumption or income differs between country groups (high- vs low-income countries or advanced vs EM economies).

Household debt as percent of GDP

Figure 3
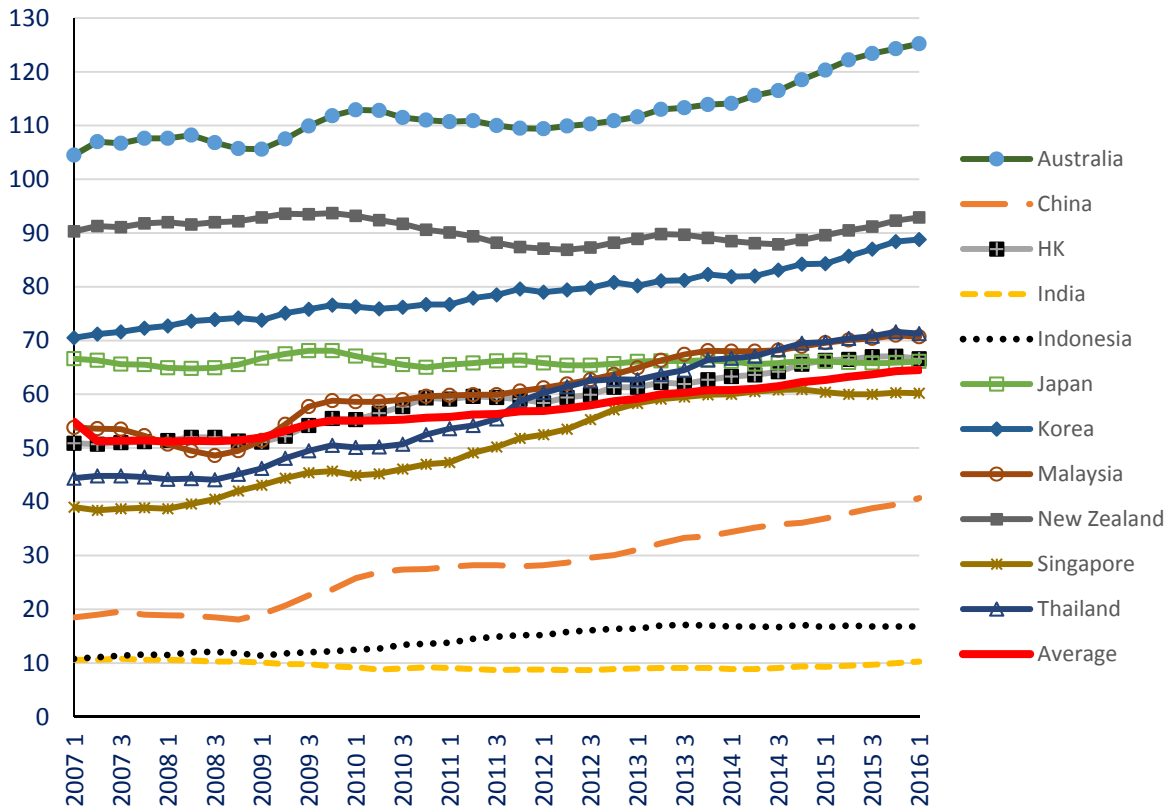
Notes: This figure on the household debt to GDP ratio comprises 11 Asian Countries (2007Q1–2016Q1). The Philippines is not included owing to data availability.

Source: FRED.

Drivers of private credit: changes in the ratio of bank lending to GDP

Figure 4
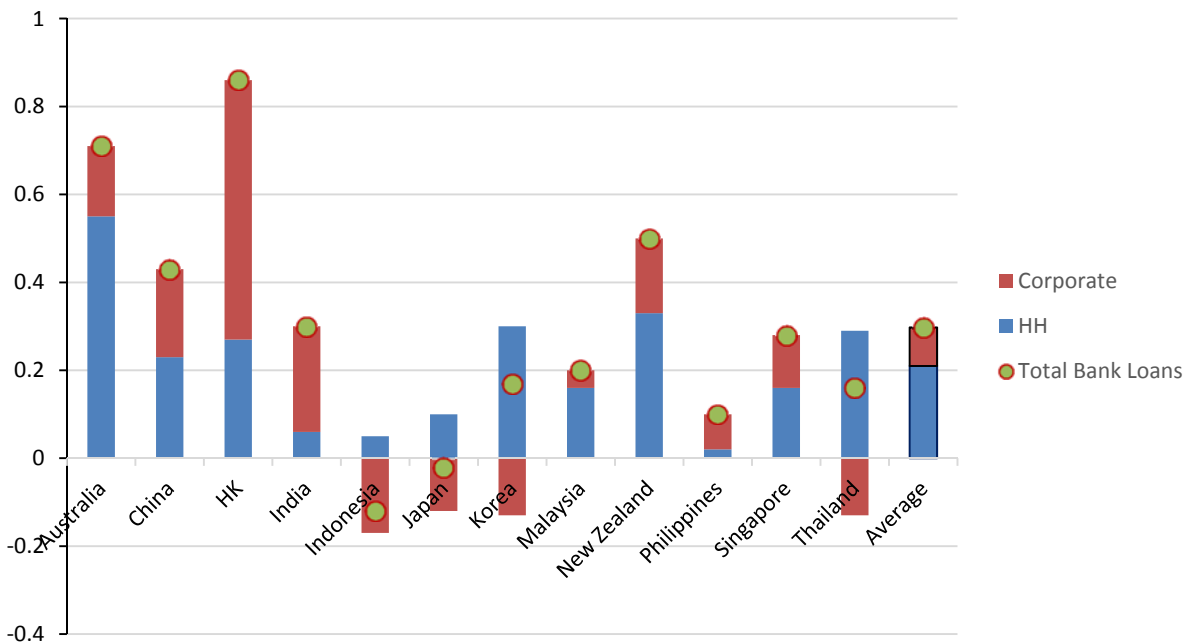
Source: Schularick and Shim (2016) Table 2.

A. Korea: loans to households (y-o-y annual growth, %)
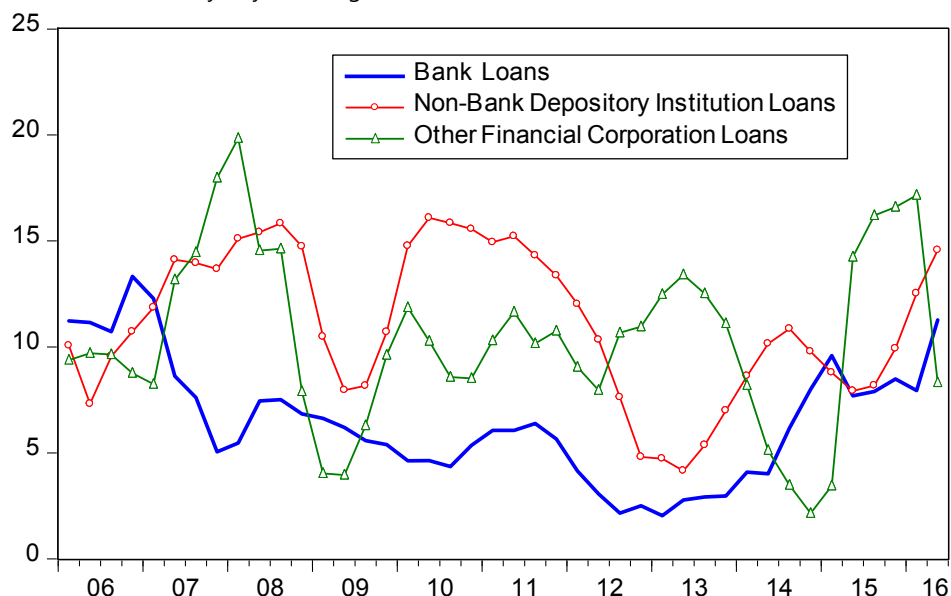
B. Thailand: loans to households (y-o-y annual growth, %)
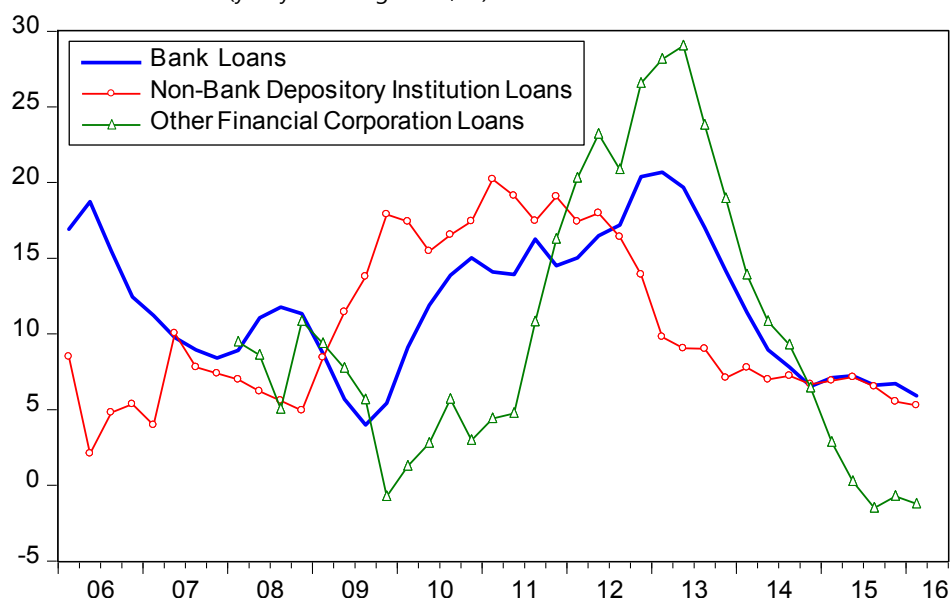
Note: In panel A, other financial corporations comprise insurance, pension, specialised credit financial companies, public financial institutions, and other financial intermediaries.

Source: Haver Analytics.

The paper's findings shed light on the complementarity of monetary policy and macroprudential policy for macro-financial stability. Macroprudential policy has an effect on HH credit but no pronounced one on output and inflation – suggesting its use primarily for financial stability. Considering policy complementarity, do the two policies move in the same or opposite direction in terms of the policy stance? Clearly, given high inflation pressures, monetary tightening could accompany macroprudential tightening. Conversely, against disinflationary pressures and

mounting HH debt, could there be a mix of monetary loosening and macroprudential tightening?

A related recent study by Choi and Cook (2016) examines a mix of monetary and macroprudential policy mix for inflation targeting economies. This study finds that macroprudential tightening is more likely to temper inflation or slow credit growth when the economy is booming and more likely to occur to check credit expansions when inflation is below target while monetary policy space is limited. It also suggests increasing needs for the mix of accommodative monetary policy and tighter macroprudential policy at low inflation and low growth.

Specific comments

Let me now give my specific/technical comments on the paper. First, in measuring policy actions, the authors could consider including policy rate target changes in monetary actions and loan-to-deposit ratio changes in prudential actions. Second, instruments for domestic policy rates to control for foreign policy (p 25) could include unconventional monetary policy measures undertaken by the Fed, ECB, and BoJ (or global liquidity) – in addition to the US policy rate – as they could also have affected domestic policy rates. Third, it could be checked if the cumulative effects of monetary policy on output and inflation that widen over the projection horizon (Figure 11) could reconcile the stability of the system. Fourth, to consistently estimate policy effects on inflation, regressions could control for imported inflation or structural factors because, for example, macroprudential tightening may coincidently concentrate on the era of oil and commodity price falls.

My last comment is that the paper could benefit from taking into account the recent debate on macroeconomic trilemma or dilemma in using instrumental variables for estimation. Following Jordà, Schularick, and Taylor (2015), the paper isolates fluctuations in domestic interest rates driven by the base country, exogenous to the domestic economy, to deal with the macroeconomic trilemma (p 14). The paper introduced the term, z_{it}, to account for a direct link between domestic and global interest rates for peg countries with open capital accounts. Even for floats, however, it is hard to isolate domestic interest rate policy from global interest rates under capital mobility by keeping expected appreciation aligned with the (desired) interest rate differential. So, exchange rate regimes may not matter, as in the argument for dilemma (Rey (2015)). In this light, the paper could introduce another control for floats with capital mobility.

Summary

To summarise, Schularick and Shim's paper covers very important issues emerging in the region: HH credit and policy options for macrofinancial stability. It nicely contributes to the literature on monetary and macroprudential policies with comprehensive data and empirical rigour. The paper offers very useful findings for policymakers who need to harmonise proactively the two policies with constrained policy space in the face of low inflation/growth and financial imbalances.

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Rich debt, poor debt: assessing household indebtedness and debt repayment capacity[1]

Muhamad Shukri Abdul Rani, Siti Hanifah Borhan Nordin, Chin Ching Lau, Sheng Ling Lim and Zhen Shing Siow[2]

Abstract

In this study, we explore the relationship between the debt service ratio (DSR) and individual borrowers' ability to withstand shocks in Malaysia. Using a micro-level dataset that matches borrowers' debt and income, we quantify the financial resilience of individual borrowers and subsequently simulate a model of loan default and credit losses in response to generated financial and economic shocks on debt repayment, cost of living and variable income. The simulation allows us to differentiate the sensitivity of borrowers in different income segments to each shock and estimate the banking system's exposures to borrowers who are more likely to default. The observations and findings could contribute towards the formulation of more targeted policies to manage household indebtedness in Malaysia. The results show that, in the pre-shock scenario, borrowers across all income groups are more likely to have a negative financial margin if their DSR is above 60%. However, for borrowers in the bottom 40th percentile income group, some borrowers with a DSR of less than 60% also recorded a negative financial margin. In the post-shock scenario, borrowers across all income groups are more likely to have a negative financial margin if their DSR is above 40%. On aggregate, borrowers are most sensitive to an income shock, particularly those in the middle income group.

Keywords: household debt, household balance sheet, stress test, debt service ratio

JEL classification: E20, E21, E58, G28

1. Introduction

In the aftermath of the global financial crisis, the high level of household debt in several advanced economies has been blamed for the slow economic recovery. Countries with the fastest increase in household debt prior to the crisis experienced the sharpest drop in real private consumption during the recent crisis (Glick and Lansing (2010)). Mian and Sufi (2010) found that US counties with the largest increase in the debt-to-income ratio in 2002–06 displayed the largest decline in private consumption following the crisis. One potential explanation is that highly leveraged households prior to the crisis were compelled to reduce their spending due to tighter borrowing conditions. Another possible reason is that some households cut their expenditures as a precaution in anticipation of weaker income and employment outlook.

Household debt in Malaysia has expanded annually by 10.7% since 2009 to account for 88.7% of GDP as of 2016Q3. Several structural and demographic factors have contributed to the increase in household debt. First, the working age population of Malaysia (ie those aged between 15 and 64 years old) increased from 67.7% in 2009 to 69.1% in 2014. Second, the median household income grew annually by 11.7% between 2009 and 2014. Third, there was greater access to financing schemes and favourable lending conditions (low interest rates and longer loan tenures). The share of households with at least one loan facility has increased to 65% in 2014 from 55% in 2009.

The household debt-to-GDP ratio has been commonly used to measure the level of household indebtedness. However, a high household debt-to-GDP ratio may not necessarily imply that households are over-indebted or in financial distress (Bilston et al (2015)). The composition of household debt is an important consideration as some debt is taken on for the purpose of accumulating wealth, which, over time, can add to the financial buffer which can be tapped when required (Bank Negara Malaysia (2015c)). While the number of delinquent and impaired loans in Malaysia has remained low relative to total credit extended to the household sector, the attendant credit risk and its implications for financial stability should not be underestimated. Taking this into account, this paper explores the nexus between debt servicing capacity across the income spectrum and how individual borrowers respond to potential economic and financial shocks. To this end, the paper uses borrowers' income and debt data obtained from a Bank Negara Malaysia internal database to calculate the borrowers' financial margin.

We then apply various simulated economic and financial shocks to the financial margin of these individuals to identify the potential deterioration in their debt repayment capacity. We apply the sensitivity analysis model adopted by Bilston et al (2015) and Albacete and Fessler (2010). The results show that, in the pre-shock scenario, borrowers across all income groups are more likely to have a negative financial margin if their debt service ratio (DSR) is above 60%.

This paper is organised as follows. Section 2 describes the distribution of household debt in Malaysia. Sections 3 and 4 introduce the model and results, respectively. Section 5 discusses the limitations of the model. The final section concludes the paper with a discussion on policy design implications.

2. Stylised facts

In Malaysia, about 38% of household debt is owed by those in the top 20% of the income distribution (Graphs 1 and 2). The median DSR for this income segment is relatively low at 30% (Graph 3). The Appendix provides the formula for computing the DSR. While the debt held by borrowers in the bottom 20% and 20%~40% of the income distribution accounted for only 13.2% of total household debt, the median DSR for each income segment is higher at 37% and 34%, respectively. The average size of debt peaked at RM 283,000 for those in the top 20% of the distribution (Graph 4), largely supported by higher income and debt servicing capacity.

The higher income segment has a larger share of debt for wealth accumulation purposes such as the purchase of residential properties and securities (Graph 5). In contrast, lower income borrowers have most of their loans for consumption purposes (eg purchase of motor vehicles and personal use). About 52% of debt in value terms owed by those in the bottom 40% of the income distribution is based on a variable rate, compared with 72% of debt owed by those in the top 20% (Graph 6).

Distribution of debt, by income and DSR	Graph 1
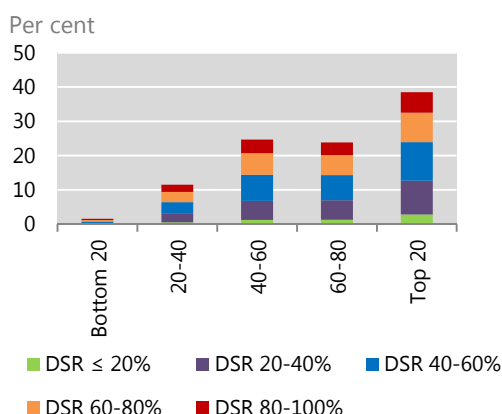
Proportion of DSR for borrowers within each income group	Graph 2
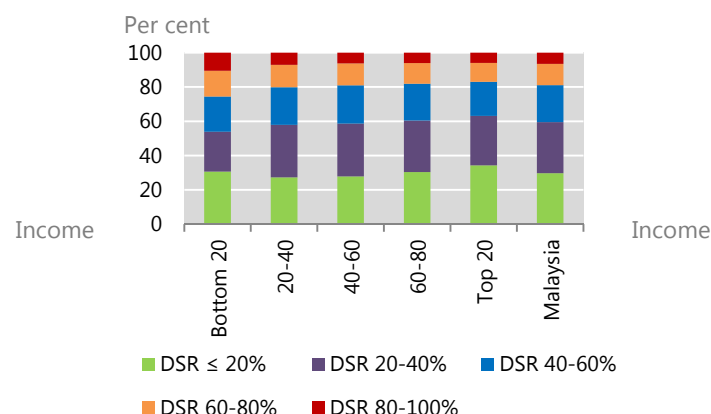
Median DSR	Graph 3
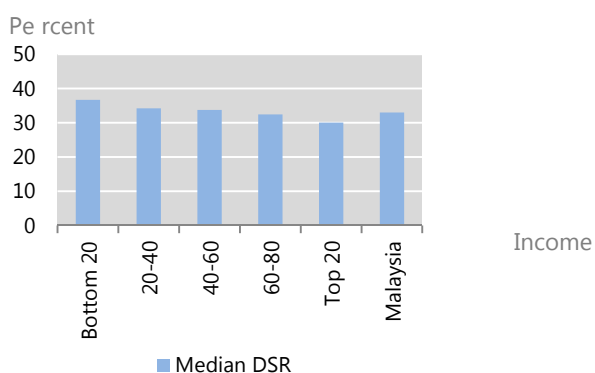
Average debt per borrower	Graph 4
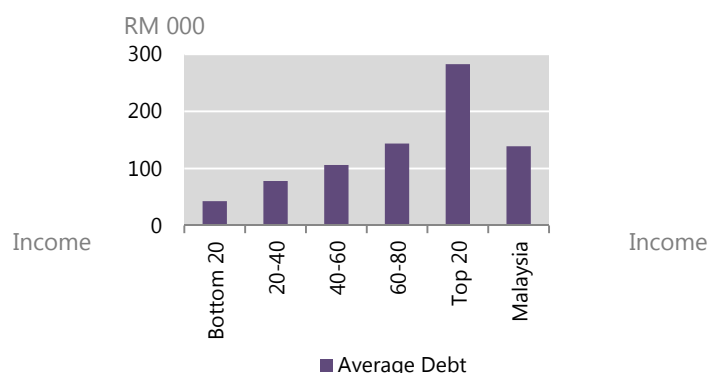
Proportion of loan facility for
borrowers within each income group Graph 5
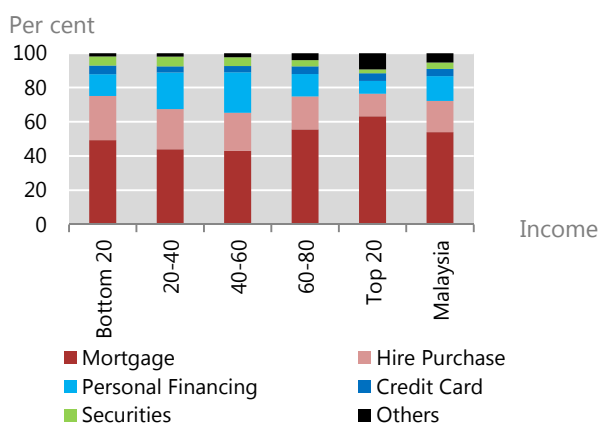
Proportion of pricing type for
borrowers within each income group Graph 6

Per cent

- Mortgage
- Personal Financing
- Securities
- Hire Purchase
- Credit Card
- Others

Per cent

- Fixed Rate
- Floating Rate
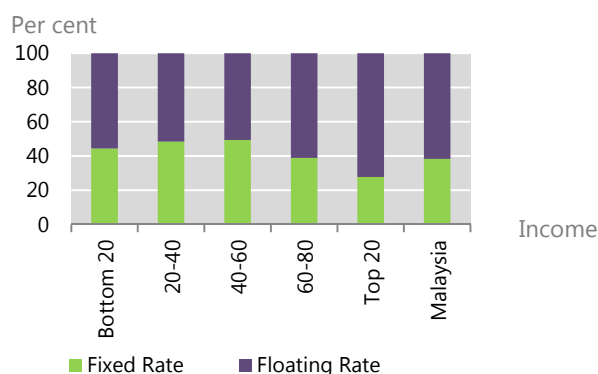
3. Methodology

3.1. Data

The main dataset employed in this paper is the Integrated Income Indebtedness Database (IIID) established by Bank Negara Malaysia using the latest available cross-sectional data on taxable income and credit in 2014. The sample used in this article has close to 2 million individual borrowers and captures approximately RM 200 billion or 20% of total household debt in Malaysia. This represents about 5% and 10% of Malaysian population and labour workforce, respectively. We also leveraged on the Household Expenditure Survey (HES) 2014 and Household Income and Basic Amenities Survey (HIBA) 2014 (Department of Statistics Malaysia, 2015a and 2015b) to estimate individuals' expenditure on basic necessities.[3] To ensure consistency with other official publications, the clustering of income groups in this paper is based on the structure of HIBA 2014.

3.2. Model

This paper adopts the financial margin approach, similar to the methodology applied by Bilston et al (2015) and Albacete and Fessler (2010) to determine the level of financial distress among individuals. Table 1 depicts a schematic representation of the assessment framework.

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[3] Items in the basic necessities category include (i) food and non-alcoholic beverages; (ii) housing and water, electricity and gas and other fuels; (iii) transportation; (iv) education; and (v) healthcare (Bank Negara Malaysia (2015b)).

Model assessment framework				Table 1
Step	Parameters of interest	Interpretation		
1	Financial margin	Residual income, sufficient to make ends meet		
2	Probability of default	Default if financial margin falls below zero		
3	Debt-at-risk (DAR)	Share of net debt (those who defaulted) to total household debt that lenders cannot recover		
4	Scenarios	Compute steps 1–3 for each scenario		
		Pre-shock	Individual shocks	Combined shocks

Note: see the Appendix for detailed formulae.

The financial margin is the residual income (net of statutory obligations, debt repayment and expenditure on basic necessities) that is sufficient for an individual to make ends meet. An individual is assumed to be in default with certainty if the financial margin or residual income is less than zero. We assume that individuals do not use their assets, savings or any form of liquid assets to avoid default (Albacete and Fessler (2010)). Total income is derived from the IIID. Each individual's personal disposable income is computed by deducting the estimated income tax and mandatory contribution to the Employee Provident Fund (EPF). Using the granular credit information in the IIID enables us to estimate the monthly debt obligation for every debt facility for each individual. Meanwhile, expenditure patterns for each income group were obtained from the HES 2014.

The debt-at-risk (DAR), which is essentially the expected loan losses to lenders, is the share of net debt from those who defaulted to total household debt. In our analysis, we assume that lenders are able to recoup only 50% of the collateral value for housing assets. Other loans are assumed to have a loss-given-default of 100%.

Individuals' financial resilience is further assessed under different stress scenarios. This paper considers three different financial and macroeconomic shocks – higher cost of borrowing and cost of living,[4] and lower income for borrowers. The impact on financial resilience is derived from the individual shocks as well as combined shocks (Table 2).

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[4]   This paper assumes that the proportion of expenditure rises by an equal measure for all income levels and that substitution effects do not take place.

Selection of macroeconomic and financial shocks			Table 2
Shocks	Parameters	Magnitude	Rationale
Financial shock: borrowing cost	Higher credit/ funding costs, impact via monthly debt repayment	↑ 50bps	Based on increase in the average lending rate (ALR) following two consecutive increases in Overnight Policy Rate (OPR) in 2006 (funding cost)
		↑ 150bps	Based on the largest increase in ALR from 10.6% to 12.1% during the Asian Financial Crisis (credit cost)
Macroeconomic shock: cost of living	Increase in basic expenditures, impact via residual income	↑ 10%	Compounded annual growth rate (CAGR) for expenditures on basic necessities over 2009–14: 10.1% (Source: HIES 2014)
		↑ 20%	Doubling of the CAGR for expenditures on basic necessities
Macroeconomic shock: income	Decline in variable income, impact via total income	↓ 10%	On average over 2011–14, variable income accounted for 7% of total income – round up to 10% for simplicity (Source: Malaysian Employers Federation (MEF))
		↓ 20%	Based on the maximum level of variable income as a percentage of total income in 2014 (Source: MEF)

4. Results

4.1. Pre-shock scenario

4.1.1. Pre-shock scenario: financial margin

In Malaysia, individuals with a negative financial margin are estimated at 16.6%[5] of total borrowers in the dataset, comprising mainly those from below the 60th percentile income groups (Graph 7) or those with a high DSR of above 60% (Graph 8). The associated debt held by those with a negative financial margin accounted for 32.1% of total household debt, comprising mainly loans for the purchase of residential property. These were acquired mainly by the mid- to high-income earners (Graphs 9 and 10).

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[5]   Similar to the findings of Albacete and Fessler (2010) that the percentage of households in financial distress in Austria is up to 15.6%.

Distribution of financial margin by income

Graph 7

Per cent of borrowers

■ Negative FM ■ Positive FM
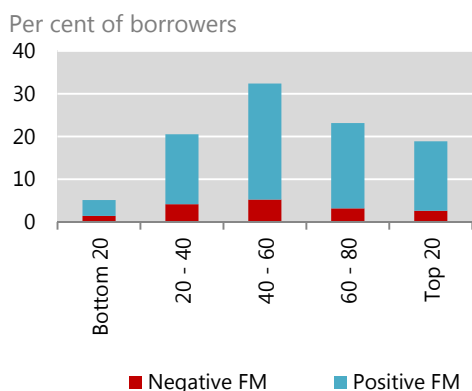
Distribution of financial margin by DSR

Graph 8

Per cent of borrowers

■ Negative FM ■ Positive FM
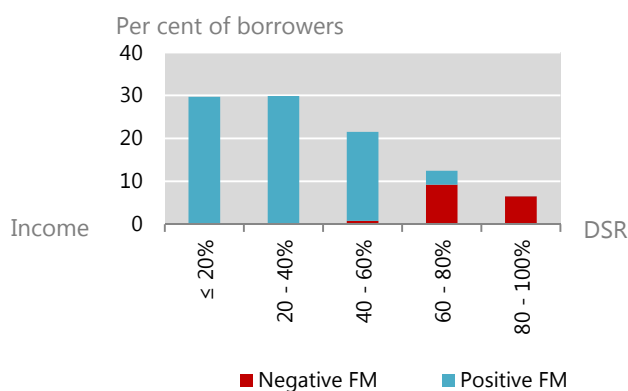
Distribution of loan facility for those with negative financial margin by income

Graph 9
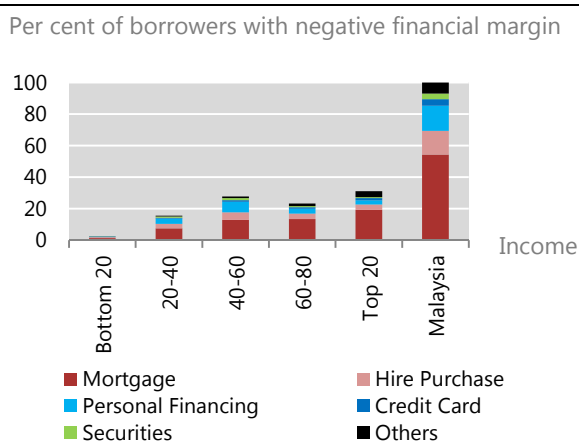
Per cent of borrowers with negative financial margin

■ Mortgage   ■ Hire Purchase
■ Personal Financing ■ Credit Card
■ Securities   ■ Others

Proportion of loan facility for borrowers with negative financial margin within each income group

Graph 10

Per cent of borrowers with negative financial margin

■ Mortgage   ■ Hire Purchase
■ Personal Financing ■ Credit Card
■ Securities   ■ Others
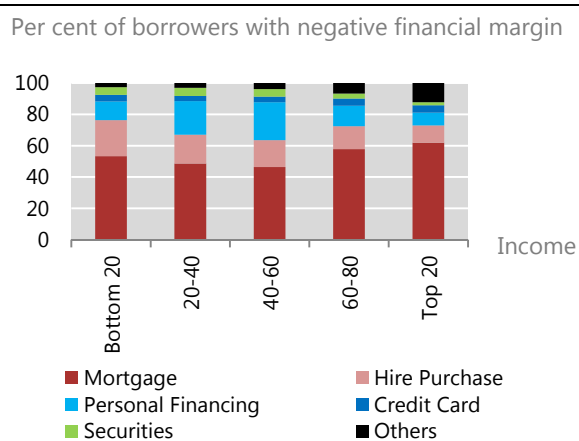
Generally, borrowers with a DSR of less than 60% do not exhibit a negative financial margin (Graph 11). However, for those in the bottom 40th percentile income group, some borrowers with a DSR of less than 60% also recorded a negative financial margin. These only accounted for 6.9% of the total number of individuals in the bottom 40th percentile income group (Graph 12).

Distribution of DSR for borrowers with negative financial margin by income

Graph 11
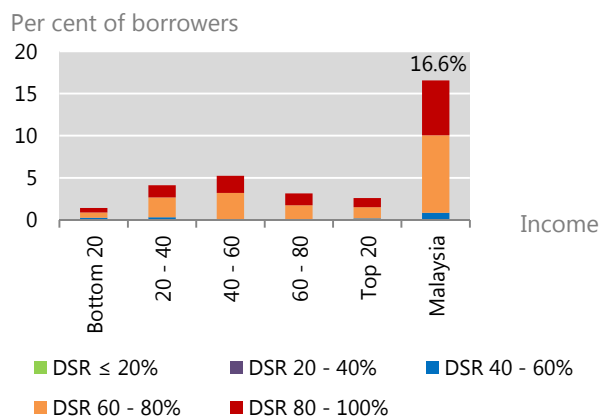
Per cent of borrowers

Legend:
- DSR ≤ 20%
- DSR 20 - 40%
- DSR 40 - 60%
- DSR 60 - 80%
- DSR 80 - 100%

Proportion of DSR for borrowers with negative financial margin within each income group

Graph 12

Per cent of borrowers within each income group

Legend:
- DSR ≤ 20%
- DSR 20 - 40%
- DSR 40 - 60%
- DSR 60 - 80%
- DSR 80 - 100%
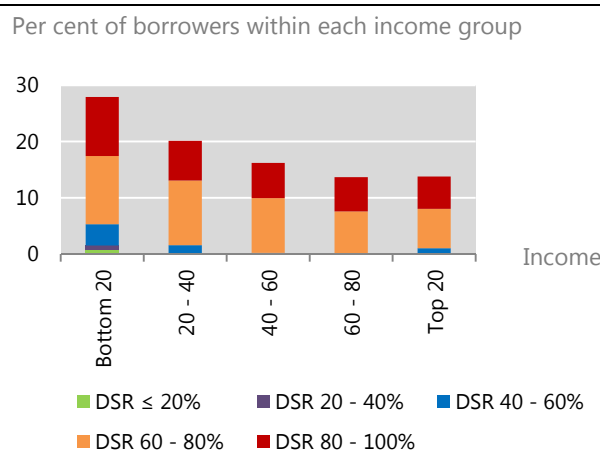
Delinquent[6] and impaired loans[7] in this sample accounted for 0.8% and 0.5% of outstanding loans, respectively. About 60% of the delinquent and impaired loans are contributed by those from the bottom 60th income percentile, half of which are from the bottom 40th income percentile. The higher impaired loan ratios for those with a DSR 40% and below across all income segments need to be interpreted with caution. One possible explanation is that borrowers whose loans have been restructured or rescheduled are classified as "impaired" in this dataset – their DSR typically declines to lower levels following the lower new obligated monthly repayments. Across all income groups, for individual borrowers with a negative financial margin, delinquent and impaired loan ratios are higher for those with a DSR of 60% and above (Graphs 13 and 14).

Delinquency ratio

Graph 13

Distribution by income and DSR

Ratio, %

Legend:
- Negative FM
- Positive FM

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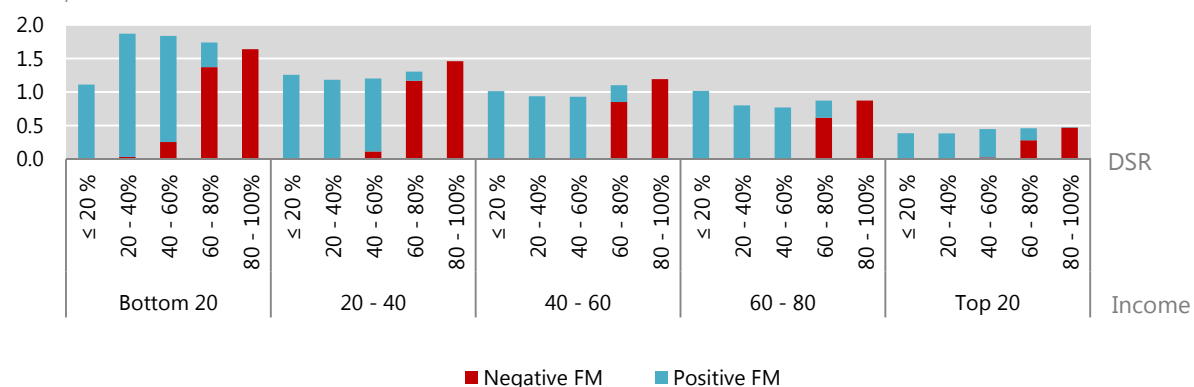
[6]   Loans-in-arrears of between one and three months.
[7]   Loans-in-arrears of three months or more.

Distribution by income and DSR
Ratio, %
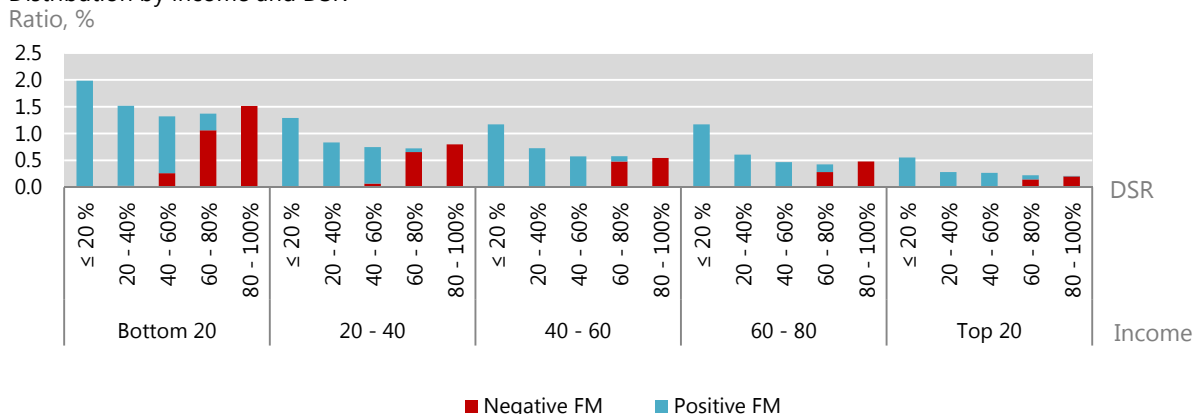
4.1.2. Pre-shock scenario: debt-at-risk (DAR)

The overall DAR of individuals with a negative financial margin in the pre-shock scenario is estimated at 20.2% of the total debt in the dataset, with a risky net debt of RM 43.2 billion. Individuals with a DSR of higher than 60% are the main contributors to this (Graph 15). When we break down by income percentile, the DAR is highest for the 40th~60th percentile income category, contributing about 30% to the overall DAR. This is attributed mainly to the higher proportion of non-collateralised debt, which is mainly loans for personal use and car purchase (Graph 10).

| Distribution of debt-at-risk for borrowers with negative financial margin by income | Graph 15 | Proportion of debt-at-risk for borrowers with negative financial margin within each income group | Graph 16 |
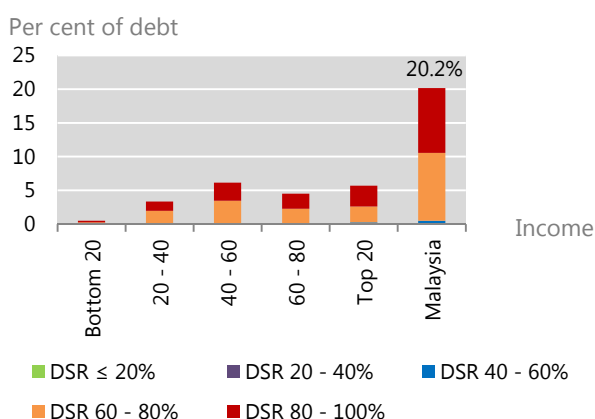
Per cent of debt

Per cent of debt within each income group
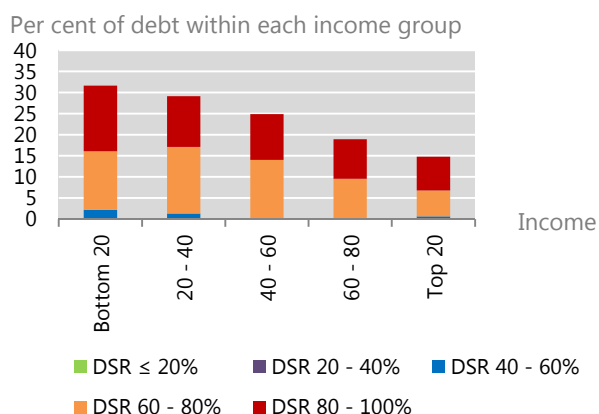
About half of the DAR is from the 60th income percentile and above. This simply reflects the higher size of debt owed by this group (Graph 1) and does not imply that the credit risk exposures to this group are riskier. Further analysis within each income group shows that borrowers will likely have a lower DAR as earnings increase (Graph 16). The DAR accounts for 18.9% and 14.8% of the DAR in the 60th~80th and

top 20th income percentiles, respectively, within the same income categories. In contrast, this is higher at 31.6% for borrowers in the lowest income percentile. All DARs are computed without taking into account other financial assets or savings that can be drawn upon, which could potentially result in a lower DAR.

4.2. Post-shock scenario

This subsection discusses the impact of simulated stress scenarios based on both financial and macroeconomic shocks as highlighted in the previous section. Our analysis suggests that, even after combining all shocks based on the worst-case scenarios, the banking system in Malaysia is able to withstand the associated potential losses. This is reflected in the stress test results as summarised in Table 3. The amount of risky net debt to the banks, after taking into account the collateral value for housing loans, is estimated at RM 77.5 billion, well within the total capital of the banking system in 2014.

Scenario simulation   Table 3

Scenario	Financially distressed borrowers (PD=1; FM<0)					
	% of total number of borrowers	% of amount of debt	Debt-at-risk (%)	Risky net debt (RM billion)		
				Banking system	Non-banks	Total
Pre-shock	16.6	32.1	20.2	35.2	8.0	43.2
Post-shock: single						
Cost of borrowing shock (150 bps)	19.1	38.1	23.2	41.3	8.6	49.9
Cost of living shock (20%)	22.7	41.2	25.9	45.1	10.5	55.6
Income shock (20%)	34.7	57.7	36.4	63.2	14.8	78
Post-shock: combined *(all of the above)*	48.1	74.2	44.3	**77.5**	17.5	95.0

Source: Bank Negara Malaysia.

4.2.1. Post-shock scenario: cost-of-borrowing shock

The debt repayment capacity of borrowers is largely unaffected by the simulated 50 basis point hike in the lending rate (Graphs 17 and 18). Some signs of distress, however, are observed when the lending rate increases by 150 basis points. The impact is more evident amongst the mid- to high-income individuals. This is due mainly to the higher proportion of loans for the purchase of residential property based on variable interest rates acquired by these individuals (Graph 9), compared with the lower income group, where the loans are mainly based on fixed interest rates. Of significance, a 150 basis point hike in the lending rate raises the proportion of borrowers with DSR levels of 40%~60% and a DSR above 60% by 1.1 percentage points and 1.4 percentage points, respectively. On the other hand, DAR increases marginally by 1 percentage point (+RM1.2 billion) and 2.1 percentage points (+RM3.3 billion), respectively, as exposures are mainly for the purchase of properties.

Negative financial margin – individual and combined shocks

Graph 17

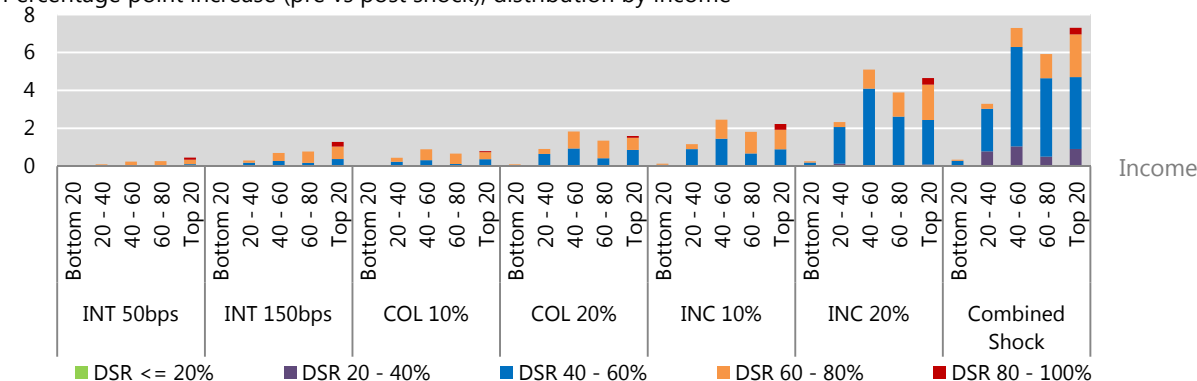Percentage point increase (pre vs post shock), distribution by income
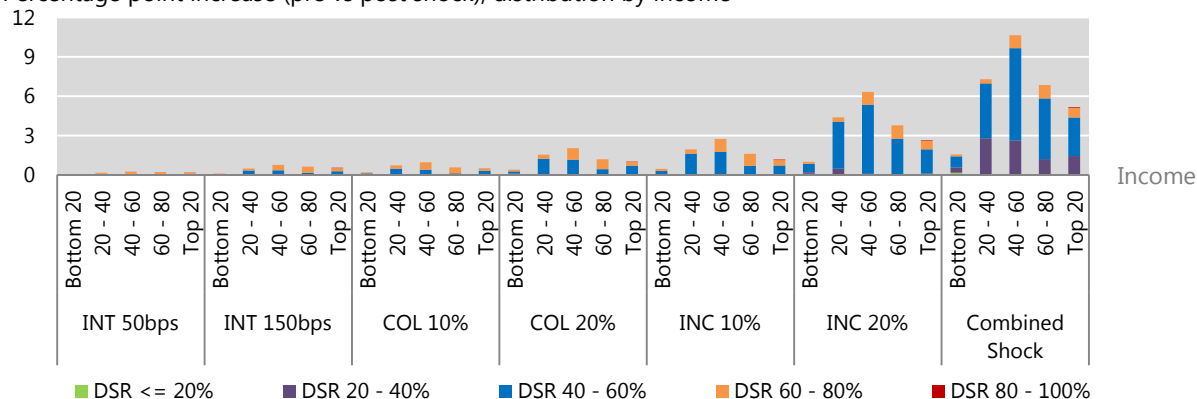
INT50bps, INT150bps: increase in interest rates by 50 bps and 150 bps respectively; COL10%, COL20%: increase in cost of living by 10% and 20% respectively; and INC10%, INC20%: decline in income by 10% and 20% respectively.

Debt-at-risk – individual and combined shocks

Graph 18

Percentage point increase (pre vs post shock), distribution by income

INT50bps, INT150bps: increase in interest rates by 50 bps and 150 bps respectively; COL10%, COL20%: increase in cost of living by 10% and 20% respectively; and INC10%, INC20%: decline in income by 10% and 20% respectively.

4.2.2. Post-shock scenario: cost-of-living shock

The impact of a higher cost of living on individual borrowers is slightly higher than the cost-of-borrowing shock. The overall share of borrowers with a negative financial margin and the DAR increases by 2.9 percentage points and 2.8 percentage points, respectively, when the cost of living goes up by 10% (Graphs 17 and 18). About two thirds of the increase in the number borrowers with a negative financial margin is mainly from those below the 60th income group percentile. The higher income earners only become more financially stretched when the cost of living increases by 20%. The increase in the number of individuals who now exhibit a negative financial margin is larger amongst those with DSR levels of 40%~80%, but the corresponding DAR is limited, even at the higher cost of living of 20%. Borrowers aged between 30 and 40 years old living in the city are found to be the most affected by the higher cost-of-living shocks.

4.2.3. Post-shock scenario: income shock

The impact from a decline in income is the most significant compared to other simulated shocks, particularly for those in the middle income group (Graph 17 and 18). On aggregate, a decline in income by 10% will increase the share of borrowers with a negative financial margin by 7.9 percentage points, while DAR rises by 7.8 percentage points to 28%. Even borrowers in the 20%~40% DSR bucket begin to exhibit a negative financial margin under the simulated shock, particularly for those in the bottom 40th income percentile category. Of significance, every borrower who has a DSR greater than 60% also exhibits a negative financial margin.

4.2.4. Post-shock scenario: combined shock

The combination of all three simulated shocks is obtained by taking the extreme magnitude of each shock. The share of borrowers with a negative financial margin increases by 31.5 percentage points across all income groups under the combined shock scenario (Graphs 17 and 18).

To recap, under the pre-shock scenario, we have established that individuals with a DSR of more than 60% are more susceptible to default. This is extended to those with a DSR of 40%~60% under the individual macroeconomic and financial shocks. Under the combined shock scenario, individuals who exhibit a negative financial margin extend to those with a lower DSR of 20%~40%.

5. Model limitations and future work

We acknowledge that the methodology applied in this paper has some limitations that require further calibration in order to support policy analysis and formulation. We intentionally used a relatively simple model and assumptions, given that this is the first attempt to use the IIID. As data quality and mining methods improve in the future, we will be able to explore more sophisticated models with less broad-based assumptions.

The probability of default computed in this model is likely to be overestimated as savings and/or liquid financial assets are not recognised as buffers against shocks. DAR could also be overestimated, given the high haircut of 50% for residential properties in this model. Also, the model does not take into account any effects of possible policy intervention by the Government and Bank Negara Malaysia to manage the potential impact on the economy and financial system. The predictive ability to capture household financial stress using micro-level datasets is also relatively untested. Nevertheless, the model does provide a useful starting point for developing a holistic stress-testing framework to assess financial system exposures to individuals in distress.

The data used in this paper are a cross-section of taxpayers' income and credit in 2014. The model assumes that individuals 'jump to default' in a single period. Including multiple periods and other dynamics could potentially affect the overall results. Basing macroprudential analysis and decision on the data could be a challenge given the time lag. On one hand, while the structure and composition of debt and income is stable over the past years (BNM, 2015a; and BNM, 2015c), the significant change in the cost of living (BNM, 2015a) might have altered the overall

results. On the other hand, the higher house prices from 2014 to 2016 may reflect higher wealth that acts as buffers against potential shocks.

For future work, we plan to explore panel data regression to uncover a deeper understanding of the causal relationship between the DSR and delinquent/impaired loans over time. Alternatively, we can also explore other more refined methods to calculate financial margin, eg defining financially stressed individuals as those with excess expenditure over income of 20% and the DSR above 50% and 75% (Fuenzalida and Ruiz-Tagle (2009)).

6. Policy implication

The area of study covered in this paper could provide support for policy design and implementation to manage and mitigate risks arising from financial institutions' exposures to the household sector. For example, the relationship between the DSR and impaired household loans may provide guidance to both banks and regulators on indicative levels of the prudent threshold of the DSR for different income groups. This could contribute towards banks' credit underwriting, risk management and loan loss provisioning practices. It could also contribute towards a more granular application of such a technique to different borrowers with different DSRs across different age groups, geographical location and type of financing facility.

For regulators, the area of study can better support the design and implementation of targeted macroprudential and microprudential policies to address specific sources of vulnerabilities. Through the application of proportionality of regulations, this can reduce potential unintended consequences of broad policies, such as reduced access to financing by eligible borrowers. In addition, the area of study could better inform the design and calibration of stress test scenarios and parameters in assessing the shock absorption capacity of households, banks and the financial system.

7. Conclusion

In this paper, we used a new granular income and debt dataset (IIID) to study individual borrowers' debt repayment capacity. To do so, we calculated the financial margin of these borrowers and subjected them to various macroeconomic and financial shocks, including a higher cost of borrowing, an increase in the cost of living and a decline in income. We also estimated financial institutions' exposure to individuals who are more likely to be financially distressed and have a higher chance of default. The results from our empirical analysis suggest the following:

- Financial margins and the DSR are indicators that can provide greater insight into the assessment of financial distress and debt repayment capacity of households across different income groups.

- The results show that, in the pre-shock scenario, borrowers across all income groups are more likely to have a negative financial margin – and, hence, have a greater likelihood of default – if their DSR is above 60%.

- For borrowers in the bottom 40th percentile income group, a similar trend is observed if their DSR is above 40%.

- In the post-shock scenario, borrowers across all income groups are more likely to have a negative financial margin if their DSR is above 40%.

- On aggregate, borrowers are most sensitive to an income shock, particularly those in the middle income group.

- Our analysis suggests that, even after combining all shocks based on the worst-case scenarios, the banking system in Malaysia is able to withstand the associated potential losses.

Appendix

Formula

Debt service ratio (DSR)

$$DSR = \frac{\text{Monthly loan obligations}}{\text{Personal Disposable Income}}$$

where

Personal Disposable Income = Gross monthly income net of statutory deductions (such as the contribution to the Employee Provident Funds and income tax)

Financial margins and probability of default

$FM_i = Y_i - DO_i - E_i$

$PD_i = 0$ if $FM_i \geq 0$;
$PD_i = 1$ if $FM_i < 0$

Where

FM	=	financial margins
Y	=	personal disposable income
DO	=	monthly debt obligation
E	=	expenditure on basic necessities
PD	=	probability of default
i	=	subscript for individuals

Loss-given-default and debt-at-risk

$$LGD = \frac{\sum_i^N PD_i \ M_i}{\sum_i^N PD_i \ D_i} \times 100$$

$$DAR = \frac{\sum_i^N PD_i \ M_i}{\sum_i^N D_i} \times 100$$

where

LGD	=	loss-given-default
PD	=	probability of default
A	=	RM value of individual's eligible collateral
M	=	max $(D_i - A_i, 0)$: net loss in RM value as a result of an individual defaulting upon recovering the collateral
D	=	total debt for each individual
DAR	=	Debt-at-Risk
N	=	total number of individuals
i	=	subscript for individuals

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Comments on "Rich debt, poor debt: assessing household indebtedness and debt repayment capacity"

Sock-Yong Phang[1]

Summary

This paper assesses the system-wide impacts of Malaysia's rising household debt. Malaysia's household debt-to-GDP ratio (HDGR) increased from 76% in 2009 to 89% in 2016. This increase has raised concerns regarding the implications for household financial resilience and banking system stability. The paper uses a micro-level dataset that integrates income and debt to calculate financial margin (FM) and the probability of default (PD) for individuals at the baseline, and when subject to various shocks. This allows the estimation of loss to lenders in the event of default, and from there, the banking system's debt-at-risk. The findings show that default is more likely for households with a debt service ratio of greater than 60%. For higher-income individuals, default is more likely at a debt service ratio of greater than 80%. After estimating potential losses for the banking sector, the authors conclude that it is sufficiently well capitalised to withstand default losses arising from unexpected macroeconomic and housing price shocks.

International perspectives

International comparisons of HDGR show a wide range of values.[2] Malaysia's HDGR of 89% is relatively high by international standards; it is higher than the HDGRs for Japan, Hong Kong SAR, Greece and Singapore, but just below that of Portugal, Spain and the United States – countries which have recently experienced financial crises. At the same time, the financial systems of the countries with some of the highest HDGRs, ie Denmark, Switzerland, Australia, and Canada, weathered the Global Financial Crisis well, while countries at the bottom of the range with low HDGRs are there because of less developed financial sectors. Hence, HDGRs at the aggregate level do little to help inform on financial fragility. As such, the analyses provided by this study are important for assessing the resilience of Malaysia's households and banking sector.

What are the determinants of a country's HDGR? A review of the literature (Jappelli et al (2013)) finds the following factors help explain the level:

- Demand-side factors, which include population, urbanisation, demography, income, interest rates and inflation rates;

- Supply-side factors such as lenders' risk management practices, loan tenors available and competition amongst lenders;

- Institutional factors which include financial sector controls and regulations, microprudential and macroprudential regulation, bankruptcy regulation and judicial enforcement, information-sharing among lenders, home-ownership rates, housing finance systems and the generosity of pension/welfare systems; and

- Behavioural/cultural norms regarding debt and bankruptcy.

Jappelli et al (2013) find that, for the United States, the United Kingdom and European countries, relatively fast household debt growth does lead to larger increases in insolvency rates. The paper also highlights institutions as powerful determinants of household debt and default. Better judicial enforcement and information-sharing amongst lenders reduce lending risk and are associated with larger credit markets. Lending correlates with English legal origin of country. Bankruptcy procedures (and reforms when these take place) affect the sensitivity of insolvencies to household debt as well as the sensitivity to economic shocks.

Household debt and the real economy

A significant increase in a country's HDGR over time is likely to have real effects on the economy. As household debt is used to finance consumption as well as assets, it is helpful to study the impact of higher HDGR on aggregate consumption, investment, and particularly real estate investment. Trends in household debt to financial and non-financial asset ratios are also useful indicators to monitor. A study by Beck et al (2012) for 45 countries, using time series data from 1994 to 2005, finds that enterprise credit is positively associated with income per capita growth and with faster reductions in income inequality. However, household debt does not have the same positive impact.

Section IIIA of the paper provides a description of the factors responsible for the increase in household debt for Malaysia. It discusses demand side changes in population, demography, urbanisation, household income, and lower interest rates as contributing to the increase in household debt. On the supply side, financing schemes and the availability of longer tenor loans are briefly mentioned. It will be helpful to expand the discussion in this section to consider additional credit supply, institutional and behavioural factors. In particular,

- On the credit supply side – reasons for increased lending by banks and non-banks to households;

- Institutional factors – changes to bankruptcy laws or judicial processes; and

- Behavioural factors – changes in norms and attitudes towards debt and bankruptcy.

Linkage between household debt and housing market

The data show that mortgage debt is 50% of household debt – constituting the largest component of household debt. Malaysia has a high home-ownership rate – although there is considerable variation by urban locations (10% to 77%). Thirty nine per cent of the individuals in the sample have at least one housing loan. The increase in household debt can be partly attributed to the rising share of mortgage loans as this increased from 47% to 50% of total household debt between 2009 and 2016.

Drilling down to the type of loan that households take is important as default rates are different for different types of loan. Information on default rates by loan type in Malaysia would be helpful. The different default rates would be reflected in interest rate differentials for the different types of household loan. Whether mortgage loans are recourse loans in Malaysia would also affect default risk. Another institutional factor that lowers default rates would be how housing loans are financed, for both households as well as banks. Like Singapore, Malaysia has a provident fund system where savings can be used for making mortgage payments. Malaysia has also established secondary mortgage lending facilities to the banking system for making housing loans. There also exist Islamic finance housing mortgages. An assessment of how these institutional factors reduce household mortgage default risk and housing finance system fragility in Malaysia would be useful.[3]

Given these factors, the assumption of a 50% haircut on collateral value for loss-given-default could overestimate the loss from mortgage lending. With the clear and close links between household debt and housing market, central banks need to also assess the health of the housing market by monitoring housing market indicators and conditions.

As an extension to the paper, it may also be useful to analyse separately, perhaps for the more stretched cohorts within the sample, separate PDs for unsecured debt versus mortgages. Furthermore, the interest rates charged by banks on these two types of lending product would differ and the nature of borrowers who have more exposure to the one versus the other may in fact be different. Perhaps Bank Negara Malaysia (BNM) could analyse whether there are concentrations of potentially higher default loans at particular financial institutions.

Data and methodology

The paper uses a micro-level database for individuals compiled from a number of sources. This is a rich dataset of 2 million individual borrowers with the aggregate loan value accounting for 20% of household debt for 2014. In their analyses in Sections IIIB and IVB, the paper switches between using 'individuals' and 'households' in the text and for the charts, using the terms interchangeably. This was rather confusing and requires clarification.

The paper utilises an innovative approach of integrating different sources of data to calculate FM (= Y – DO – E). The data source for each of the component in the formula is different: Y is individual income obtained from the tax authority, DO is debt

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[3]   See Phang (2013) for an overview of housing finance systems.

obligation from individual credit information from the central credit system, and E is expenditure data from the Household Expenditure Survey. This reliance on different sources to calculate FM presents challenges and raises a number of questions. Did the approach implicitly assume single-worker households? What is the average number of persons employed per household and what is the average household size for Malaysia? How were rental expenditures in the Household Expenditure Survey treated for homeowners?

It is stated that the methodology utilised follows closely that of the study for Australia by Bilston et al (2015). However, there are some key differences. The Bilston et al study uses household data rather than individual data, that is, the data for components of FM are from a household survey rather than integrating across different data sets. Specifically, household disposable income, rental payments (if any) and reported second mortgages are obtained from the survey. Household asset data are also available from the household survey. The trade-off, however, is that the sample size for household surveys is typically much smaller. The sample size for the Bilston study was 6,500 households.

Various approaches have been used for estimating PD. The FM approach used in this paper assigns a probability of one as long as FM is negative, and zero if FM is positive. It does not consider that the household might tap other liquid assets or wealth, or that there might be other working persons in households. As a result, it arrives at an estimate of risky net debt to the banking sector of RM 77.5 billion if the economy is subjected to multiple sources of shocks. The paper refers to the BNM macro stress test which uses an alternative definition of PD, ie accounts in arrears divided by total number of accounts. Under this alternative definition, which uses actual delinquent/default data, the risky net debt to banking sector is much lower at RM 39.1 billion.

Yet another approach that uses micro datasets is to perform discrete regression analyses for PD that take into account socio-economic characteristics of households. This approach incorporates household characteristics but also requires that the information be available in the dataset. Recent studies include Costa (2012) for Portugal, Fasianos et al (2014) for European countries and LaCour-Little and Zhang (2014) for US mortgages. Interestingly, a recent study by Yusof et al (2015) for Klang Valley uses regression analyses and found household financial fragility to be associated with wealth, income, financial knowledge, education, ethnicity, household size and the gender of borrower.

While the paper did not assess unemployment as a stressed scenario, it may be worth considering, as a side analysis, the impact on the PD of stressing the unemployment rate. Malaysia's unemployment rate has been relatively benign in the 2.5~3.5% range over the past few years. However, there may be merit in considering a more stressed scenario under the current global climate of structurally lower growth and hence greater propensity for recessionary periods.

Conclusion

Let me close by commending the paper's innovative approach of integrating multiple sources of big data on individuals to answer an important question on the impact of rising household debt. However, a number of factors (arising from the data used)

point to a likely overestimation of PD. This itself may provide a certain comfort level, especially when the banking system is found to be sufficiently well capitalised to withstand the simulated shocks, even with the likely overestimation. However, from a systemic perspective, the same shocks will also simultaneously affect the corporate debt sector. Extending this point further, while the focus is on the system-wide impact of household debt, there may be a need to conduct more analysis on how domestically systemically important financial institutions would individually fare under the stress scenarios considered. Hypothetically, if a major institution were overexposed to unsecured lending, a stress scenario more severely impacting the cost of borrowing in this higher interest rate product segment may create systemic shocks through the solvency problems encountered by this particular institution. For these various reasons, the findings need to be interpreted with care for the purposes of policymaking.

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Balancing policy objectives in Asia: leverage vs long-term economic growth

Remarks on the Policy Panel

Deepak Mohanty[1]

I will limit my remarks to challenges of corporate financing in our region. In recent discussions, attention has been drawn to high corporate leverage in the Asian region, including my own country, India. This is considered as a significant financial stability risk. It could also have growth implications. As corporate leverage increases, it impairs the ability of firms to invest, adversely impacting overall economic growth.

What drives corporate investment? How do corporates finance their activities? Hyman Minsky gave an interesting characterisation of corporate finance. He categorised corporate financing into three types: hedge financing, speculative financing and Ponzi financing. Under hedge financing, cash flow exceeds all debt payment obligations. Under speculative financing, total expected cash flow in the foreseeable future exceeds all debt payment obligations but falls short in the near term. One example of speculative financing, in the Minsky analogy, could be infrastructure financing. It is not that infrastructure projects cannot be financed commercially, but positive cash flow occurs much later in the project. At the same time, if the assumptions about the project outlook go wrong, it could result in significant debt servicing issues. Under Ponzi financing, cash flow falls short of near-term interest payment; hence, reliance on short-term borrowings rises, and consequently debt grows. One could think of real estate investment in a scenario of ever-increasing asset prices as Ponzi financing. If the expectation of real estate price remains buoyant, it could draw substantial investment further bidding up prices. As long as prices continue to rise, such investment seems viable. But once asset prices fall, the debt burden becomes unsustainable.

In a Minsky world, financial stability or instability depends on a mix of these three types of financing. Once the market expects that the given mix is unsustainable, there is a rush to reduce debt levels leading to a fall in asset prices and profits. Bankruptcy rises. In an extreme scenario, there is precipitous fall in general activity and overall price levels due to debt deflation.

In the present world, corporate financing can also be broadly conceived along the lines Minsky suggested. Corporate investment is driven by expectations about the future prospects of growth and profit. These expectations, however, may not always materialise. Some projects may become unviable because of exogenous shocks, for example, a commodity price shock, while others could go bad because of a worsening economic outlook.

Against this useful stylised pattern for looking at corporate financing, let me turn to the stress in India' banking sector, which has arisen largely due increased leverage

in the corporate sector. The gross non-performing loans (GNPLs) of commercial banks increased sharply from 5.1% of their gross advances in September 2015 to 7.6% by March 2016 following a special asset quality review (AQR) by the Reserve Bank of India (RBI). Is it that asset quality earlier was misreported? Not really. What happened was that a significant part of standard restructured advances got reclassified as non-performing loans (NPLs) on a more rigorous scrutiny. Consequently, there was largely a compositional shift: overall stressed advances, which include both NPLs and restructured standard advances, rose marginally from 11.3% in September 2015 to 11.5% in March 2016. In addition, in order to address any possible ambiguity of interpretation in future, the accounting practice was changed so that all incremental restructured assets would be classified as NPL from the financial year 2015–16, starting from 1 April 2015.

The stress in banks' balance sheets arose because of several factors such as their increasing exposure to the infrastructure sector, the downturn in the mining and metal sectors and weakness in credit risk assessment. Industry analysis showed that industries such as iron and steel, construction, power, telecommunication and transportation, all of which had high leverage, also suffered from high interest burdens that exacerbated the stress in the banking sector. The AQR, by improving the transparency of banks' balance sheets, had several positives. First, it was welcomed by the market, as reflected in improved stock prices for banks. Second, bank balance sheets became stronger with greater provisioning against NPLs. Third, it prompted a process of gradual deleveraging in the corporate sector as banks became more discerning in their lending decisions.

It is one thing to recognise asset impairments early and provide for that. At the same time it is important to put in place a framework for banks to proactively engage with firms to seek out ways for a going concern to recover from financial distress. Such initiatives could be less disruptive, and at the end prove to be growth-enhancing. In this context, I may highlight two initiatives by the RBI.

First, to strengthen the ability of lenders for deep financial restructuring, the RBI has introduced a scheme for sustainable restructuring of stressed assets (S4A). Under this scheme, the lenders are required to partition loans into sustainable and unsustainable components. The portion of the loan that can be serviced through the existing cash flow is defined as sustainable debt. The unsustainable part of the debt is converted into equity or equity-related instruments. As a result, both the debt burden of the borrower and promoter's equity stake are reduced. The idea behind the scheme is that banks would get the upside if the company recovers, and it also gives the borrower another opportunity to turn around the company.

Second, a major challenge for many emerging market economies is the overreliance of corporates on bank credit, partly due to the inadequate development of the corporate bond market. In order to induce large borrowers to partly meet their resource requirements beyond a limit from the capital market, the RBI has introduced prudential measures to disincentivise banks from their incremental exposure to large borrowers as from the financial year 2017–18. If a large corporate is unable to achieve a reasonable mix of bond and credit financing, incremental lending by banks to such corporates will attract higher provisioning and risk weights.

While corporate debt levels still remain high, straining firms' debt-servicing capacity, I believe that that the recent initiatives will enhance transparency and promote financial stability.

Credit build-up and financial stability issues: do we know enough to calibrate appropriate intervention?

Remarks on the Policy Panel

Johnny Noe E Ravalo[1]

Introduction

The amount of credit outstanding has significantly risen in recent years. As one would expect, this is viewed with concern given the vast academic literature on the link between credit growth and financial market vulnerabilities. Also, one cannot overlook the focus of the current global reform agenda on better managing credit risks, whether it be through revising risk weights in the standardised approach, moderating cyclicality, addressing the opaqueness of shadow banking or evaluating the effect of financial technology. While the policy concern over credit growth is palpable in regulatory spheres, the view on the ground suggests that a lot of unknowns exist.

This is partly due to the lack of data and rigorous empirical support, both of which this conference is addressing. However, I would argue that there are other nuances that need to be considered. Specifically, credit dynamics need to be understood in the context of changed market conditions and expanded central bank operating concerns. It is no longer enough to argue that "excessive" credit growth is a known driver of recessions. Instead, we have to better understand the changed context of when, where and how credit growth is an issue.

Changed market oversight

The rise in the outstanding debt of corporates and households is often attributed to the low interest rate environment, which has persisted for some time. Phrased in this manner, the prudential issue would be how underwriting standards are holding up and the extent of defaults that may arise when interest rates eventually readjust to higher levels.

We have certainly seen this play out before. However, although it is a perennial concern, this is not automatically a financial stability issue in the current context. Even in the absence of a universal definition, we think of financial **in**stability not just in terms of the size of the problem (in currency terms) but more so in terms of the

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breadth of its dislocation. That is, instability cuts across financial segments, thus leading to a breakdown of the cash, contingent and capital markets, including its clearing and settlement functions.

If we are to consider corporate debt and household indebtedness within the overarching prudential norm of financial stability, it has to be more than just the intertemporal effects of credit. Rather, we have to see credit growth through a modified set of policy lenses and assess it against enhanced prudential standards, recognising that financial stability is "different" in its management of relevant risks.

At Bangko Sentral ng Pilipinas (BSP), we have coined the term "*CL2 risks*" to focus our attention on why and how financial stability matters. We appreciate that **credit concentrations** that are unmatched by effective risk management have a debilitating effect and this can be magnified quickly through the financial market via channels of risk, ie ***contagion***. Apart from the known issues regarding credit cycles, **leverage** is also an issue because there are many blind spots that nurture concentration and contagion challenges. And, depending on how these channels of risk pan out, ***liquidity*** in the market may be impaired, causing further distortions, if not dislocations.

This is how we analyse the emerging issues. As it turns out, while it provides us with a means to think of the linkages, there remain challenges in execution. The rest of my comments focus on the linkages and the challenges we see from them.

Corporate leverage has risen

The issue is that there are too many unknowns about the rise in credit. Since the specific features of the loan agreement are unknown except to the contracting parties themselves, it will not be evident to third-party analysts how corporates are using the loan proceeds by looking simply at financial statements. For example, the rise in debt and a fall in profitability may be explained by the deliberate decision to invest into long-gestating undertakings, sacrificing short-term carrying costs for an expected longer-term increase in productivity and profitability.

Anecdotally, we do hear of such initiatives among Philippine corporates. This is so in light of the prolonged period of Philippine growth, favourable demographics and bright economic prospects. In our private discussions with various corporate executives, we also note their active management of debt, taking on a preference for fixed-rate local currency obligations while remaining open to foreign currency obligations when they see strategic value in line with their operations.

On the face of it then, higher corporate debt may just be a response to an expanding economy. The debt levels must be monitored but they are neither automatically a financial stability concern nor are vulnerabilities necessarily imminent. Admittedly, there is opaqueness because the balance between benefits and costs will be unknown unless the loan terms are made public. That said, some precautionary interventions may already be warranted.

Foremost, the absence of periodic and more granular data needs to be addressed. For banks, banking supervisors are already putting in place measures to exert better control over concentration and contagion risks. In line with the Basel Committee on Banking Supervision (BCBS) best practices, there is a minimum

leverage ratio while the Committee continues to deliberate on amendments to the standardised approach for credit risk.

While banks are generally covered, the bigger challenge lies with the non-bank sector, specifically non-financial corporations (NFCs). Apart from the audited annual statements, there are no mandatory reports for corporations that can be seen as the counterpart of the periodic prudential reports required of banks. In fact, there are no prudential standards applicable against, for example, leverage or a debt-to-income ratio.

Data compiled for the BSP Financial Stability Committee suggest that NFC leverage has increased in recent years.[2] We also know from BIS reporting countries that cross-border debt incurred by non-bank corporates in the Philippines increased from USD 7,781 million as of end 2008 to USD 13,046 million as of March 2016.[3]

In the sample data we monitor, we also find that the corporations that have increased their debts have also experienced a decline in their ROE. On paper, this indicates some impairment in their capacity to pay, but more granular information tells us that the bulk of the outstanding loans will mature in three to five years. Thus, unless there are specific cross-default cross-acceleration provisions in the debt contracts, this "impairment" may not be as imminent as it may seem.

The point is that we see the debt build-up in publicly available corporate balance sheets but we do not yet fully appreciate what lies behind these figures. The financial stability concern cannot be defined exclusively by the increase in leverage. Rather, it is the fact that the results of network analysis and contingent claims analysis tell us that debt defaults strongly link the real economy and banks.

This is then no longer a conceptual issue but a prudential policy concern. On this basis, we have made some early interventions. For mortgage exposures, for example, BSP has been deliberate in not setting caps or introducing tax measures. Instead, we impose a targeted real estate stress test whose acronym, REST, was not chosen by accident. Depending on the results of the tests, we require the banks to explain their particular risk management strategies to the satisfaction of the regulator.

Our more complex banks also face a minimum 5% leverage ratio. This is deliberately higher than the 3% under the Basel Accord, indicating a lower cap of 20 times on the bank's gearing ratio instead of the global threshold of 33 times. We meant this to have a signalling effect, but we were comfortable that it would not cause unintended consequences since our quantitative impact study (QIS) indicated existing leverage ratios well above the proposed 5% threshold prior to the formal approval of the local standard.

On the NFCs, there is collaboration with the Philippine Securities and Exchange Commission (SEC), among others,[4] for a survey to be released. This will measure the extent and profile of NFC debts, from both onshore and offshore sources. Based on

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[2]   There is no systematic data for the leverage ratio among corporates in the Philippines since they are not among the required information submitted in the audited annual financial statements. The data referred to cover both listed and unlisted firms. The sample is made up of firms that collectively make up the top 50% of their industry's total assets.

[3]   Data are accessible from the BIS website.

[4]   This survey is part of the work being undertaken by the Financial Stability Coordination Council, an inter-agency collaboration between BSP, the SEC, the Insurance Commission, the Philippine Deposit Insurance Corporation, the Bureau of the Treasury and the Department of Finance.

periodic analysis of this survey, pro-active interventions may be considered to precisely mitigate the build-up of *CL2 risks* that concern us.

Increased focus on household indebtedness

The OECD has pointed to increasing household indebtedness as a major concern, particularly when seen in the light of the financial literacy results regarding money management, saving and retirement planning. However, if data are an issue for corporate leverage, one can only imagine how household indebtedness is an even bigger data gap concern.

Certainly, household finance is inherently difficult to monitor. Countries such as the Philippines do not have direct data on household finance except for infrequent surveys that do not track the same families over time. The informal financial market is likewise an important facet in emerging market economies – as a venue for funding and in the context of financial inclusion – and this is inherently difficult to capture in quantitative studies. Furthermore, demographic data confirm that there is great variability across Philippine families, so that the very concept of a "household" is not going to be consistent across geographical locations and across socio-economic classifications.

The closest data we have are those for consumer loans from banks.[5] Between September 2008 and the latest figure of September 2016, consumer loans increased from PHP 400.1 billion to PHP 1,202.6 billion.[6] The latter represents 11.6% of nominal GDP – as opposed to 5.7% in September 2008 – which appears modest when compared to often-cited Asian regional data.

The key fact remains, though, that we have seen this portfolio triple in size in only eight years. Conceptually, any concern over the pace of the debt build-up can be evaluated akin to the interest coverage ratio for corporates. Thus, the household's capacity to service its debt would have deteriorated if household saving before interest and taxes[7] had not also tripled in eight years, which translates into an annual compounded growth of 14.75%.

Currently available data, unfortunately, are not granular enough to make such a determination. Thus, at this juncture, we will continue to monitor the issue while trying to devise ways to address the material gap in data. As in the case of corporate leverage, we note that household debt (or its closest proxy indicator) shows an increase over time. Nonetheless, we do not have the full range of information needed to categorically conclude that this is a financial stability issue. Relative to our *CL2 risk* framework, we cannot close the issue because we do not have any basis as yet for concentration, contagion and liquidity.

Let me just recall that the data mentioned above do not cover informal market indebtedness. While the latter is clearly a data gap, a tangential issue that has been raised is whether household indebtedness has any implication for the financial

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[5] This means of course that these clients have already been vetted by their banks in terms of capacity to pay and thus are technically "financially included".

[6] Basic data were sourced from the BSP website.

[7] This is the counterpart of EBIT for corporations.

inclusion initiative. Should there be extra concern that a portion of the household debt build-up is due to families that are essentially on the cusp between the formal and informal financial markets?

The issue can be phrased more generally by asking whether the extent of financial inclusion is inversely related to financial stability, ie that financial inclusion causes financial instability. Although our concern in this forum is credit, this general question can also be asked on the deposit side. The policy concern is whether deposits of modest balances (of the type associated with microfinance and inclusion) are more prone to contagion risk in the event of a market shock.

On this point, a study done by Canlas et al (2016)[8] looks at micro data from bank closures in the Philippines and examines the behaviour of deposits belonging to the smallest deposit bucket after the closure of the bank. Using a difference-on-difference analysis, the authors find no evidence to support the view that small deposits are much more volatile than large deposits. In fact, both small and large deposits are shown to be withdrawn before the bank is closed, which suggests that information is not as asymmetric as is typically assumed. As concluded by the authors, "even if financial inclusion were to become more widespread (ie via small deposits), it is not any more a source of financial instability than large deposits, at least as far as bank runs are concerned".

Clearly, much more can be done to properly situate the household within the financial inclusion-financial stability space. The results from Canlas et al (2016), though, provide some early evidence that modest saving balances in banks are not as diametrically different from the behaviour of large deposit balances as may be assumed. The build-up in consumer debt should be monitored and data gaps need to be addressed, but on the whole the evidence is not explicitly conclusive that *CL2 risks* have developed to the extent that macroprudential policy intervention is already warranted.

Final thoughts

The preceding point effectively summarises the credit situation in the Philippines. We certainly see debt-related numbers rising for both corporates and households but there are data gaps that prevent a categorical conclusion on whether or not financial stability concerns are already present. The fact that the Philippines has enjoyed 71 straight quarters of positive growth suggests expanding potential income and wealth. The increase in corporate debt may be to further augment productive capacity in the real sector while the increase in (the proxy of) household indebtedness reflects enhanced demand for real estate, credit cards, auto loans etc due to increased wealth.

Thus, unless there is better information, one cannot draw unambiguous conclusions, specifically with respect to financial stability. We should again point out that these data gaps are not trivial. What would be needed is granular, if not transactional, information so that the debt can be juxtaposed against the *current* use

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[8] Dante B Canlas, Johnny Noe E Ravalo and Eli M Remolona, "Do micro deposits run more than other deposits? Three event studies of contagion and financial inclusion in the Philippines", 2016, paper presented at the BSP-BIS conference on "Financial inclusion and central banks" held on 2–4 June 2016 in Cebu, the Philippines.

of funds and the borrower's *future* cash flows. Gathering such information from the borrower may be deemed intrusive and a breach of confidentiality. Thus, some other means will have to be found to be able to properly assess the market landscape.

Setting aside the data gap issue, what is often raised today is whether policy intervention is needed on corporate and household debt at this juncture and what form these interventions should take. Addressing the issue of incomplete and imperfect debt-related data will settle the question regarding the absolute state of the market, ie whether credit conditions are "good" or "bad". However, given the limitations on data, it is still possible to phrase the issue in more relative terms.

The increase in corporate leverage and household indebtedness can, for example, be measured against an increase in corporate and household income. Relative to a reference point, we can then define the current state as being "better off" or "worse off" than the reference point.

From what is known to us, it does seem that the sharp build-up in debt has not been matched by a commensurate increase in income. From the perspective of a central bank, our intervention is with the lender and, for this reason, we have tools such as REST, a higher minimum leverage ratio, a higher regulatory capital adequacy ratio, and a calibrated handling of the liquidity coverage ratio.

However, if the focus is squarely on NFCs and/or informal market borrowing by households, these issues extend beyond the usual remit of central banks. This is where it becomes more of a financial stability concern and, as such, will require cross-agency collaboration in the event that a single financial stability entity has not been designated.

Enhanced surveillance is a given but beyond this, there may be other parallel interventions. Cross-border cross-currency borrowings, for example, may need to be hedged so that NFCs do not become either too-big- or too-interconnected-to-fail.[9] Periodic surveys of NFCs to gather high-level debt data will be useful as well.

On the household side, financial inclusion, financial literacy and consumer redress initiatives may be heightened so that informal borrowing can be brought within the remit of formal markets. Some consideration may also be given in structuring new reports for banks for their retail loans just so that a better picture can be generated by regulatory authorities.

On the whole, while there remain many open issues, regulatory authorities do need to act pro-actively. The interventions will likely be jurisdiction-specific but there are options to consider which essentially address what we do not (but need to) know while introducing some sand-in-the-wheels to prudentially temper (but not curtail) current credit growth trajectories if these cannot be explained in risk-based terms.

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[9]   A related concern is that non-BIS reporting jurisdictions do not see the full extent of cross-border banking statistics from the BIS. While standards certainly need to be maintained, there may be scope to assist non-reporting countries to be elevated to reporting countries, while at the same time the BIS may consider on a bilateral basis providing more analytical information to jurisdictions in this transition.

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