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국제학석사학위논문

**Effectiveness of Macroprudential Policies in
Preventing Volatile Capital Flows:**

A Focus on Emerging Asia

거시건전성 정책이 불안정한 자본흐름에 미치는 영향
: 아시아 신흥국을 중심으로

2015년 8월

서울대학교 국제대학원
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문 성 희

**Effectiveness of Macroprudential Policies in
Preventing Volatile Capital Flows:**
A Focus on Emerging Asia

A thesis presented
by
Katherine MOON

Graduate Program in International Commerce
In Fulfillment of the Requirements
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Effectiveness of Macroprudential Policies in Preventing Volatile Capital Flows: A Focus on Emerging Asia

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ABSTRACT

Effectiveness of Macroprudential Policies in Preventing Volatile Capital Flows:

A Focus on Emerging Asia

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The global financial crisis reinforced the extent to how globalized and interwoven our economies and financial systems are. The economic downturn thereafter highlighted to policymakers the new challenges we face in the global era, and the fundamental lack of understanding of system-wide risk. In response to these challenges, policymakers realized the need to go beyond purely microprudential approach to financial regulation, which evolved into a growing consensus that a macroprudential approach to regulation and supervision is necessary.

While the clear guidelines and toolkits of macroprudential policies are still being defined by the academic world, this paper takes a preliminary look at the effect of macroprudential policies, specifically in protecting small open economies in Southeast Asia from the volatility of capital flows. Specifically, I focus on the countries that experienced the Asian financial crisis as there are literature expressing these countries' resilience from the

global economic crisis due to the many structural and financial reforms that were required under the IMF conditionalities.

The results show that emerging economies in general became less sensitive to "push" factors which drive capital flows after the implementation of macroprudential policy. However, countries that experienced the Asian financial crisis grew to be more sensitive to global conditions, in contrast to the comparison group of countries.

Key Words: capital flows, macroprudential policy, Asian financial crisis, global financial crisis, emerging economies

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Introduction

The global financial crisis of 2008 and spurts of following economic crises around the world thereafter have reinforced the globalization of our economies and the interwoven nature of our financial systems. Economies witnessed failing financial systems and prolonged crisis aftershocks instigated by the US housing bubble, which quickly manifested into a global liquidity crisis. Consequently, new economic expressions and ideas made its way into the public sphere, including discussion of a "two-speed global recovery" citing widening gaps in economic recovery between advanced economies and emerging market economies (Kim 2011).

One specific concern in the emerging market countries (EMEs) following the crisis was the large and volatile capital flows into emerging economies, spurred mostly by the bouts of quantitative easing implemented by the United States Federal Reserve. For many emerging economies in Southeast Asia, this was a flashback to the days prior to the Asian financial crisis where they experienced huge inflows of foreign capital in the form of both foreign direct investment and the more volatile portfolio investment. The unstable nature of these capital inflows contributed to an eventual banking crisis that spread across the whole region. The resurfacing of such rapid resumption of capital flows has revived efforts to unearth determinants of these flows and more importantly, how economies can protect themselves from the negatives consequences of economic policies abroad.

In response to the growing vulnerability of EMEs to capital inflows, a number of countries have responded by using macroprudential instruments to deal with swings in capital flows (Galati and Moessner 2013). Macroprudential measures are defined as regulatory policies that aim to reduce systemic risks, ensure stability of the financial system as a whole against domestic and external shocks, and ensure that it continues to function effectively (Unsal 2011). While conventional monetary policy maintains its role in counteracting

inflation, past experiences have demonstrated its limitations in guarding against the risks of financial instability, especially instability instigated by global factors.

The purpose of this paper is to evaluate whether countries that experienced the Asian financial crisis were better equipped to protect their economies from these volatile capital flows in comparison to other emerging economies. This paper focuses on the countries that experienced the Asian financial crisis (hereafter AFC countries) since they have continued to fortify their financial system following the Asian financial crisis. This assessment is based on the theoretical framework developed by Bruno and Shin (2014), which looks at the effectiveness of macroprudential policies in Korea, and Bruno and Shin (2013), which analyzes global liquidity where global financial conditions drive banking sector capital flows.

This paper is based on a panel study of 11 emerging countries, wherein the AFC countries include Indonesia, Malaysia, Philippines, South Korea (Korea) and Thailand, in a complete sample that includes emerging market economies over a time span from 2000Q1 to 2014Q3. My approach is split into two stages. In the first stage, the relationship between gross capital outflows from the US and capital inflows into countries is assessed, particularly in terms of how the relationship changes with the introduction of a time dummy for 2010, representing the implementation of macroprudential measures. Using this as a benchmark for comparison, in the second stage those countries that experienced the Asian financial crisis and other countries are compared in order to assess whether AFC countries were more effective at protecting themselves from volatile capital flows.

Based on the empirical results, there is evidence that capital flows have become less sensitive to global factors following the introduction to macroprudential measures in emerging economies. However, when assessing the patterns of capital flows specifically at the countries that experienced the Asian financial crisis, the experience is opposite. The incremental sensitivity to global liquidity conditions was higher after 2010.

The outline of the paper is as follows. In the background, the dangers of capital flows as assessed by the experience of emerging economies with financial crises is investigated, with a focus on evaluating the effects of the Asian financial crisis of 1997 and the most recent global financial crisis of 2008. Next, the development of and the academic discussion around macroprudential policies are explained. The empirical investigation follows, concluded by a discussion about the results and its implications.

Background

2.1 Emerging Economies and Financial Crises

Existing literature traditionally groups determinants of capital flows into “push” and “pull” factors (Fratzscher 2012). The “push” factors refer to particular monetary and fiscal policies in advanced economies, and the “pull” factors refer to country-specific determinants. After the global financial crisis, academics have begun to reexamine the role of global factors in driving capital flows, or the “push” factors. For example, Nier, Saadi-Sedik, et. al (2014) analyzed the effect of the global financial cycle, measured by VIX, on capital flows. It found that the effect of global financial conditions on gross private capital flows increases depending on the host country’s level of financial sector development, implying that countries cannot fully protect themselves from global financial shocks. Specifically in the Asian context, we have witnessed small but open economies suffer due to global financial shocks.

Asian Financial Crisis of 1997

The Asian financial crisis of 1997 (AFC), a period of regional financial contagion, shed light on the dangers of volatile capital flows in rapidly growing economies in East and Southeast Asia. During this time, there was a tendency in the West to blame bad policies, bad institutions and crony capitalism for the crisis; while these factors undoubtedly had a role to play, discussion at the time downplayed the unstable nature of private capital flows, which caused chaos in small but open financial markets (Leung 2014).

During the height of the AFC, net private capital flows were estimated to have increased more than five-fold over six years (Ito 1999). In 1990, total capital flows to developing countries were at about 50 billion USD, of which one-half went to Asia and one-third went to Latin America. By 1996, total capital flows more than quadrupled by exceeding

230 billion USD, with relatively equal breakup between Asia and Latin America. Only a handful of countries received disproportionately large amount of capital inflow. From 1990 to 1995, only eight countries received more than \$15 billion in net long-term capital inflows including, China (more than \$150 billion), Mexico (more than \$80 billion), Brazil (\$60 billion), Korea (\$50 billion), Malaysia, Argentina, Thailand, and Indonesia. China, Mexico, and Brazil are relatively large countries with large economics, but in ratio to GDP, Malaysia and Thailand received the largest capital inflows at more than 10 percent, which led to a larger capital flow shock than many other Latin American countries (Ito 1999).

Table 1. Net capital inflows (percent of GDP)

Country	Period	1988	1989	1990	1991	1992	1993	1994	1995
Indonesia	1990-95			2.5	1.9	1.3	0.2	1.1	3.6
Korea	1991-95				2.6	2.5	0.6	2.4	3.5
Malaysia	1989-95		2.9	5.7	11.1	15.3	23.2	1.2	6.6
Philippines	1989-95		2.1	3.9	4.4	2.3	4.4	7.9	5.2
Thailand	1988-95	7.4	10.4	12.3	12.3	8.6	7.7	8.3	12.1
Argentina	1991-94				1.3	3.8	2.9	3.1	
Brazil	1992-95					2.8	2.3	1.9	4.8
Chile	1989-95		3.3	8.6	3.1	7.4	6.3	7.7	4
Colombia	1992-95					1.8	5.6	5.6	5.3
Mexico	1989-94		2.6	2.2	7.5	7.6	8.5	3.3	
Peru	1990-95			3.9	5.4	5.3	4.6	10.8	8.2
Venezuela	1992-93					3.3	2		

Source: World Bank

*Numbers higher than 10 bolded

Undoubtedly, such large sums of capital flows contributed to the economic growth of Asian countries. Many of the ASEAN countries, including Singapore, Malaysia, Thailand and Indonesia, heavily relied on the foreign capital to fund its industrialization process in the 1980s. While Japan had been upgrading its industries from textiles to automobiles and high-tech products, Korea and Taiwan followed a similar industrialization path. The ASEAN countries were behind Korea and Taiwan on the industrialization ladder, but rising in front of China and Vietnam. Particularly in some industries like textiles, capital flows played an important role in development. As they lose competitiveness as the result of wage hikes in one country, for example Korea, a company will look to move its factories to a lower wage country like Thailand. If management skills are transferable to different countries, this will accelerate the industrialization process of the host country. The host country eventually develops its own industries as skilled workers and middle-level management become more available through training at foreign firms (Ito 1999).

Although it was very clear that many of the Asian countries, particularly the ASEAN countries, relied on foreign investment to achieve industrialization, *too much* capital inflow created some real problems in the development of their respective economies. The interest rate differentials between domestic and international markets prompted surges of cheap but short-term foreign currency lending to the newly liberalized markets in the region to finance long-term investment in domestic currency. This exposed the region's banking and corporate sectors to huge risks in the event of a reversal of capital flows. When foreign investors pulled their capital from the region in 1997, domestic banks that ran currency and maturity mismatches were squeezed for liquidity, causing a widespread banking crisis (Leung 2014).

In response to the Asian financial crisis, these countries had to fortify their financial systems. These reforms are attributed to creating a more resilient banking system in the

region, which arguably was the reason why emerging East Asia's financial systems and institutions were relatively shielded from the direct impact of the global financial crisis.

In particular, there are three key areas where improvements have been made at a national level. First, they have strengthened macroeconomic policy frameworks, especially in building up substantial reserve cushions as a line of defense against possible future market volatility. Another area of change is the improvements of transparency of policies and availability of information. With the help of IMF under its transparency initiatives, authorities now publish more high frequency information, including information on external debt and reserves. The third major change is that these countries have undertaken important efforts to reform financial sectors and improve corporate governance. These include overhauling regulatory and supervisory systems, raising accounting standards and strengthening shareholder rights. Corporations have also substantially lowered their debt levels, with debt equity ratios sharply reduced across the board. As a result of these changes at both the national and regional level, the strength and resilience of Asia's financial sectors have been enhanced, making the region better off in benefiting from globalization and better able to recover from bouts of global financial market turbulence (Muchhala 2007).

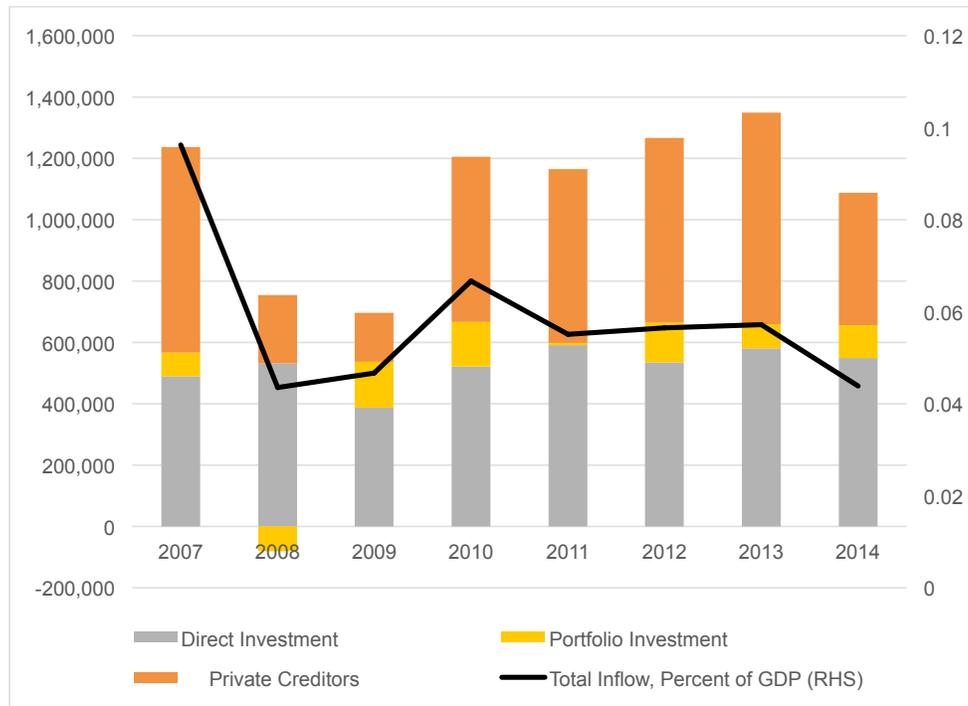
Despite the turbulence caused in the Asia region by the financial crisis of 1997, global attention did not focus on the inherently unstable nature of capital flow until the eruption of the global financial crisis. Like the Asian crisis, the global financial crisis was preceded by strong surges in capital flows to the US. However, when the depositors and investors had their confidence shaken by a large amount of subprime assets held by banks, they rapidly pulled 'runnable' assets from the banks in mass, leading to the infamous liquidity crisis (Leung 2014).

Global Financial Crisis of 2008

In late 2008, in response to the rapidly deteriorating economic and financial conditions following the global financial crisis (GFC), the US Federal Reserve (Fed) pushed the federal funds rate target close to zero and implemented its quantitative easing policy. Subsequently, this “push” factor created spillover effects to emerging market economies with sound macrofundamentals as they faced large and volatile capital flows when investors sought high-yielding assets. As analyzed in detail by Mendoza and Terrones (2008) and Bruno and Shin (2013), these volatile capital flows can trigger a financial instability cycle for small open economies: a surge in capital flows leads to a currency appreciation, an improved balance sheet of borrowers, easier credit conditions, increase in non-tradable prices and overall inflation, a further appreciation of the currency, and further capital inflows (Aysan, Fendoğlu et al. 2013).

This type of ultra-loose monetary conditions by the US proved to fuel credit and asset bubbles in emerging markets. But during periods of market stress and as the Fed signaled a tapering of the quantitative easing policy, or the start of its asset purchase reduction in 2013, investors became risk averse, pulling ‘hot money’ out of emerging markets into the ‘safe haven’ of dollar reserve assets on a scale that were destabilizing to the underdeveloped financial markets of emerging economies (Leung 2014).

Figure 1. Private inflows to emerging market economies



Source: IIF

Macprudential Policy of 2010

The global financial crisis has highlighted how fundamentally intertwined our global financial systems are, and the fundamental lack of understanding of system-wide risk. The need to go beyond a purely micro-based approach to financial regulation and supervision has evolved into a growing consensus among policymakers that a *macroprudential* approach to regulation and supervision should be adopted (Galati and Moessner 2013). Since this is a relatively new concept, the objective and specific toolkits of macroprudential policy are still far from being clearly defined. But as mentioned in the introduction, macroprudential measures are broadly defined as regulatory policies that aim to reduce systemic risks, ensure stability of the financial system as a whole against domestic and external shocks, and ensure

that it continues to function effectively (Unsal 2011). The general view is that the specific goals of macroprudential policy should be about limiting the risks and costs of systemic crises (Galati and Moessner 2013).

Unlike the literature on monetary policy, which has clear-cut consensus on the role of different instruments, there is still a lack of clarity on the role of instruments that should be used to implement macroprudential policy. This is mostly because the macroprudential approach has come to play a role in policy discussions only very recently, and defining financial stability and the goal of macroprudential policy is much more nuanced than those of monetary policy. Also, part of the difficulty is that the macroprudential policies toolkit available is in principle quite large because it includes existing microprudential tools as well as new instruments (Claessens 2014).

Based on the IMF's analysis of macroprudential policy tools and frameworks, these policies are driven by three main goals in order to mitigate causes of systemic risk and reduce externalities that contribute to adverse financial sector dynamics. The first two goals aim to reduce the occurrence and consequences of cyclical financial risks, by either dampening the expansionary phase of the cycle, or reinforcing the resilience of the financial sector to the adverse phases of the cycle. The third goal is aimed at risks that arise from interconnectedness and attempts to ensure the internalization of spillovers.

Within these goals, there are different policy tools classified by intended target and method. For instance, these can be categorized by: (1) quantitative restrictions on borrowers, instruments, or activities; (2) quantitative restrictions on financial institutions' balance sheets; (3) capital and provisioning requirements; and (4) other, including more institutional-oriented measures, such as accounting changes, changes to compensation, etc. and taxation/levies on activities or balance sheet composition. While category (1) aims to affect the demand for financing, the other categories can be seen as affecting the supply side of financing.

Specific measures within these categories include those correcting or compensating for fundamental factors that give rise to externalities and market failures, and others that compensate for policy factors that can contribute to adverse financial dynamics. For instance, one potential tool is a countercyclical capital buffer linked to the build-up of credit, which could be triggered by a broad indicator of credit growth that captures domestic and foreign provision of loans. Another tool is a cap on LTV and debt-to-income ratios, which would discourage an erosion of lending standards (Board 2011). Additionally, a levy or charges on short-term wholesale funding could also discourage overreliance on vulnerable wholesale funding, both from funding sourced domestically and abroad.

2.2 Global Banking System

In order to understand capital flows and its implications on the financial system of economies, one must have a fundamental understanding of the global banking system. Banks fundamentally serve as intermediaries who borrow in order to lend. In effect, in order to lend more to their borrowers, they must continue to seek funding. In an economy with domestic savers, the primary source of funding come from deposits to the household sector, or what is known as the “core” funding. In a credit boom, however, or if domestic savers are not sufficient, local banks must resort to alternative methods, or “non-core” methods of borrowing, to finance its lending. Cross-border bank financing, where banks draw on funding by global banks, is typically a crucial component of “non-core” funding, especially in countries with open banking sectors (Bruno and Shin 2013). Therein lies the sensitive connection between cross-border bank financing, also represented by capital flows, and a credit boom.

According to a study by BIS, the branches and subsidiaries of foreign banks in the United States borrow from money market funds and then proceed to draw on the cross-border

funding and lend those funds to local borrowers in their home countries (Cetorelli and Goldberg 2012). These funds which were channeled from foreign banks in the US to their home countries are measured in net interoffice assets of foreign banks in the US.

Hypothesis

In the first stage of this paper, I use net interoffice assets as a proxy for gross capital outflows from the US in order to understand its relationship with capital flows, and include a time proxy variable as the introduction of macroprudential measures. I compare these two coefficients to assess whether macroprudential measures were effective in slowing capital inflows. Using this relationship as a baseline in a cross-country panel study, in the second stage I compare those countries that experienced the Asian financial crisis and assess whether AFC countries were more effective than non-AFC countries in protecting themselves from volatile capital flows.

My hypothesis is that those countries that experienced the Asian financial crisis should be better equipped with a stronger financial system compared to other countries signified by a negative correlation in net interoffice assets. Specifically, I expect that my baseline regression will exhibit a positive correlation between net interoffice assets and capital flows, but a negative correlation when paired with the time dummy variable. When paired with interaction terms of AFC countries, I expect the AFC countries to have a negative correlation with capital flows compared with non-AFC countries. Next, I expect these countries to have a stronger negative correlation when paired with the time dummy variable (before and after 2010), since they will have implemented further macroprudential policies to protect themselves from volatile capital inflows.

The basis of this hypothesis is twofold. First, it is because these countries have had the experience of the Asian financial crisis where many had to strengthen their financial system to cope with the challenges of a financial crisis. Second, the global discussion of macroprudential policies and the respective countries implementation of macroprudential measures are expected to have better equipped these countries from volatile capital flows triggered by global factors. While I expect to see higher capital flows into these emerging

economies, I ultimately expect to see more restricted flows after 2010, after the introduction of macroprudential measures.

Data

As mentioned above, the five countries analyzed are the five main countries that experience the Asian financial crisis, namely Indonesia, Malaysia, Philippines, South Korea and Thailand. In analyzing the impact of macroprudential policies on the volatility of capital flows in these Asian countries, I selected a complete sample size of 11 emerging countries based on available and complete data, and based on countries where foreign banks play a significant role in the country's financial system. This list of emerging economies is based on the WEO 1994 publication which divides between emerging and advanced economies.

The selected countries in our sample include Brazil, Chile, Czech Republic, Hungary, Indonesia, Malaysia, Mexico, Philippines, Russia, South Korea, and Thailand.

Summary of Variables

Dependent Variables	External Claims	=	External loans + External deposits
Independent Variables	Interoffice	=	(-) net due to foreign-related offices
Control Variables	VIX	=	log(VIX)
	RER	=	log(nominal exchange rate)*(US CPI/local CPI)
	Money Stock	=	Growth of log(sum of MS)
	GDP Growth	=	GDP, percent change

Summary Statistics

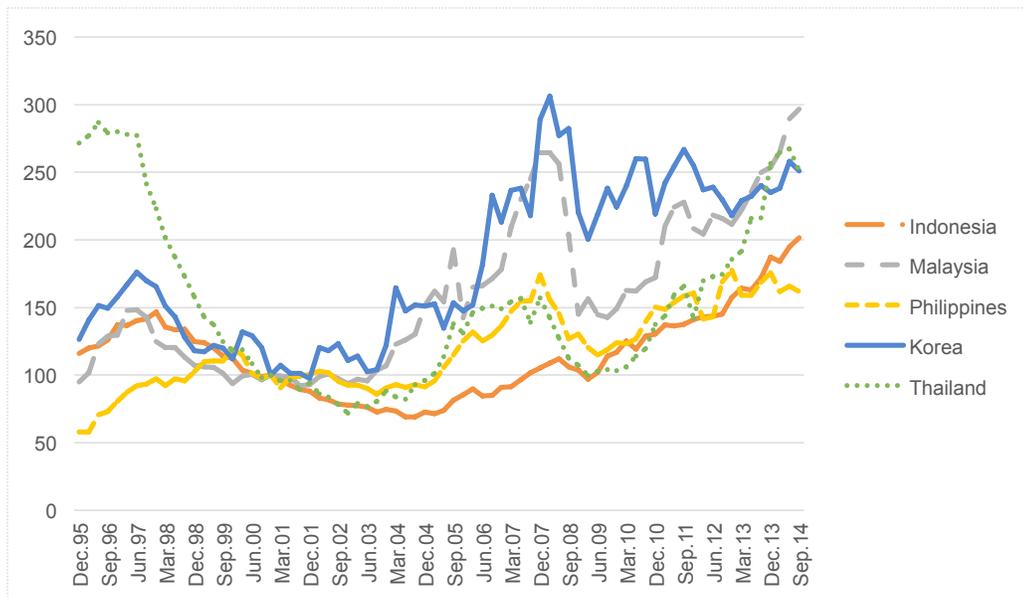
	Obs	Mean	Std. Dev	Min	Max
Interoffice	58	7.57245	28.04504	-60.95323	55.52750
VIX	58	1.28939	0.15778	1.05652	1.64483
RER	638	2.03460	1.29924	0.19118	7.16368
Money Stock	58	0.00550	0.01241	-0.01873	0.03853
GDP Growth	638	3.92648	3.16999	-11.15128	19.13164
External Claims	638	89.16047	75.50190	9.46500	440.43200

Following the theoretical framework of the Bruno and Shin (2014) paper, below is a description of the variables designated to conduct this study.

Capital Flows

As mentioned above, the dependent variable in this study is the cross-border capital flows through the banking sector. The empirical proxy is cross-border claims of the banks in countries that report loan amounts to the Bank for International Settlements. This data was collected from BIS Locational Banking Statistics, Table 7A, and calculated by the sum of loan and deposits of external claims of BIS reporting country banks on borrowers in countries.

Figure 2. External claims of AFC Countries, normalized to 100 in Dec 2000



This graph, which demonstrates the series normalized to 100 in December 2000, shows an abrupt fall in capital inflows to these countries after the Asian financial crisis, and a sharp rise in capital inflows after the September 2008, or the implementation of US quantitative easing.

Interoffice Assets

The independent variable is the net interoffice assets of foreign banks in the United States, which reflects gross capital outflows from the US. This data was collected from the Federal Reserve data, series H8 on commercial banks. A rapid increase in the net interoffice assets demonstrates an expansion of cross-border banking activities of global banks.

Figure 3. Net interoffice assets of foreign banks in the US



Net interoffice assets measure the net claim of the branch of subsidiary of the foreign banks on its parent. Usually, this figure is negative because foreign bank branches typically act as lending outposts. However, figure 3 demonstrates that the time between 2001 and 2011 was different in that net interoffice assets turned sharply positive, before reversing into being negative again during 2011, the height of the European crisis. We can assume that during the time between 2001 and 2011, foreign banks offices became funding sources rather than the usual lending outpost.

Here I only use the data from foreign banks located in the United States because of the dominant role of the US dollar in the global banking system. According to Bruno and Shin (2014), as well as Borio and Disyatat (2011) and Obstfeld (2012), the US dollar has been the currency behind the growth of gross capital flows. Because the role of other currencies are small in comparison, I focused on the net claims from foreign banks located in the United States.

Control Variables

VIX Index

I also included control variables as possible determinants of capital flows. First I included VIX index, which serves as a proxy for volatility of equity index option in the United States. This data was collected from CBOE Volatility Index in S&P 500 stock option prices. VIX essentially is a measure of investor risk appetite, and indicates the market's expectation of stock market volatility over the next 30 day period. VIX index was calculated by using the log of VIX at close value.

Real Effective Exchange Rate (RER)

I also included the log real exchange rate (RER), where RER is calculated as the log of nominal exchange rate*(US CPI/local CPI). Nominal exchange rate is in units of national currency per US Dollar. This data was found using the IMF IFS database.

World Money Supply

Growth in global money stock was calculated as the quarterly log difference of the sum of the M2 stock in the US, Eurozone and Japan and M4 in the UK. All data was acquired from the IMF IFS database.

GDP Growth

Lastly, GDP growth is the country percentage change in GDP from the previous year, collected from the IMF IFS database as well. As mentioned above, the sample period is from the first quarter of 2000 to the latest data available, which is the third quarter of 2014.

Dummy Variables

2010

2010 is used as a dummy variable representing the introduction of macroprudential policies. Clement (2010) clearly describes that while the term “macroprudential” can be traced back to unpublished documents prepared in the late 1970s, the term only became more commonly used following the global financial crisis. After the global financial crisis, the term macroprudential was used in a more targeted manner focusing on financial systemic risk, and research related to macroprudential policy became more common.

2010 is designated as the time proxy for the implementation of the macroprudential policy following the Third Basel Accord, which took place in September 2010. The Accord reflects a macroprudential approach to financial regulation by taking specific action to strengthen banks’ capital requirements and add new liquidity requirements, among other policy measures.

AFC Countries

AFC countries, as mentioned above, are a dummy variable for countries that experienced the Asian financial crisis. These countries include: Indonesia, Korea, Malaysia, Philippines and Thailand.

Methodology

Adapting Bruno and Shin (2014)'s methodology, I first create a benchmark panel regression to analyze the effect of interoffice assets on capital flows demonstrated by the equation below:

$$\Delta C_{ct} = \alpha + \beta_1 \cdot \text{Interoffice} + \text{controls} + \varepsilon_{c,t}$$

Here,

ΔC_{ct} is banking sector capital inflow to country c in period t .

$\Delta \text{Interoffice}$ is the growth in interoffice assets of foreign banks in the US in a given year

The control variables as mentioned above include VIX levels, RER, world money supply and GDP growth. Regressions include country fixed effects.

Using the above regression as a benchmark, I then apply an interaction model to 1) compare the AFC countries to non-AFC countries and 2) assess whether there is an effect of macroprudential policies on capital flows. I include a dummy variable equal to 1 (0 otherwise) for AFC countries (AFC), and a dummy variable equal to 1 (0 otherwise) for the period after 2010 (2010), as specified above. Then, I interact each dummy variable with the independent variables:

Net interoffice assets x AFC

Net interoffice assets x 2010

Net interoffice assets x AFC x 2010

creating the following equations:

$$\Delta C_{ct} = \alpha + \beta_1 \cdot Interoffice + \beta_2 \cdot Interoffice * 2010 + controls + \varepsilon_{c,t}$$

$$\Delta C_{ct} = \alpha + \beta_1 \cdot Interoffice + \beta_2 \cdot Interoffice \cdot 2010 + \beta_3 \cdot Interoffice \cdot AFC + \beta_4 \cdot Interoffice \cdot AFC \cdot 2010 + controls + \varepsilon_{c,t}$$

Comparing the coefficients of the net interoffice assets with the dummy variables, and the coefficient without the dummy variables, I can determine whether there is a significant change in capital flows to the AFC countries before and after 2010. Since 2010 is the time proxy for the application of macroprudential measures, I use this coefficient to determine whether there was any significant level of change in the capital inflows to the emerging economies. Furthermore, other variations of regressions are applied, both by country-level dummies and with a larger sample size including advanced economies, to evaluate further observations with the changes in the regression.

Variable	[1] Coefficient (Std. Error)	[2] Coefficient (Std. Error)
Interoffice	0.004464*** (0.0013)	0.007024*** (0.0017)
Interoffice * 2010	-0.010917*** (0.0019)	-0.016075*** (0.0025)
Interoffice * AFC		-0.005638*** (0.0025)
Interoffice* AFC * 2010		0.011344*** (0.0036)
VIX	0.0093 (0.0093)	0.010779* (0.0598)
RER	-0.622142*** (0.0494)	-0.625921** (0.0491)
Money Stock	-0.078425 (0.4475)	-0.078925 (0.4445)
GDP Growth	-0.013965** (0.0073)	-0.013497*** (0.0073)
Constant	1.199978 (0.2143)	1.201448 (0.2129)
<i>Observations</i>	649	649
<i>R-squared</i>	0.754802	0.75883
<i>Number of countries</i>	11	11

Table 2. Panel regression on capital flows

*** significant at 1% confidence interval; ** significant at 5% confidence interval; * significant at 10% confidence interval

Variable	[1] Indonesia Coefficient (Std. Error)	[2] Korea Coefficient (Std. Error)	[3] Malaysia Coefficient (Std. Error)	[4] Philippines Coefficient (Std. Error)	[5] Thailand Coefficient (Std. Error)
Interoffice	0.006114*** (0.0013)	0.003466** (0.0013)	0.004432*** (0.0014)	0.004877*** (0.0013)	0.004963*** (0.0013)
Interoffice * 2010	-0.013768*** (0.0020)	-0.009755*** (0.0020)	-0.010811*** (0.0020)	-0.012054*** (0.0020)	-0.011338*** (0.0020)
Interoffice * IND	-0.019414*** (0.0043)				
Interoffice * IND * 2010	0.034101*** (0.0063)				
Interoffice * KOR		0.010939** (0.0044)			
Interoffice * KOR * 2010		-0.012788** (0.0062)			
Interoffice * MAL			0.00032 (0.0044)		
Interoffice * MAL * 2010			-0.001077 (0.0063)		
Interoffice * PHL				-0.004297 (0.0044)	
Interoffice * PHL * 2010				0.011636* (0.0062)	
Interoffice * THA					-0.005426 (0.0044)
Interoffice * THA * 2010					0.004422 (0.0063)
VIX	0.023426 (0.0590)	0.011125 (0.0600)	0.000919 (0.0603)	0.01224 (0.0601)	0.009659 (0.0602)
RER	-0.689292 (0.0502)	-0.627266 (0.0493)	-0.622861 (0.0496)	-0.620593 (0.0493)	-0.620865 (0.0495)
Money Stock	-0.122171 (0.4383)	-0.07926 (0.4460)	-0.079645 (0.4483)	-0.068041 (0.4467)	-0.075792 (0.4476)
GDP Growth	-0.009993 (0.0072)	-0.01335 (0.0073)	-0.014016 (0.0073)	-0.012888 (0.0073)	-0.013816 (0.0073)
Constant	1.281285 (0.2105)	1.20222 (0.2136)	1.202037 (0.2149)	1.183267 (0.2141)	1.195581 (0.2144)
Observations	649	649	649	649	649
R-squared	0.765619	0.757219	0.754819	0.756541	0.755525

Table 3. Panel regression on capital flows BY COUNTRY

*** significant at 1% confidence interval, ** significant at 5% confidence interval, * significant at 10% confidence interval

Results

Table 2 presents the first set of panel regressions. The coefficient on [Interoffice] measures the impact of net interoffice assets on capital flows. The coefficient on [Interoffice*2010] measures the incremental impact of net interoffice assets after our time proxy 2010. The coefficient on [Interoffice * AFC] measures the incremental impact of net interoffice assets on those countries that experienced the Asian financial crisis, and finally the coefficient on [Interoffice * AFC * 2010] measures the incremental impact of net interoffice assets on those countries that experienced the Asian financial crisis in the period after 2010. In the two regressions, I include the dummy 2010 as a comparison point, to look at the changes in coefficients before and after our time proxy.

Column [1] reports the results from the baseline regression. The interoffice and interoffice with the time dummy are both highly significant, as are the coefficients to some of the control variables, RER and GDP growth. The significance and positive coefficient on interoffice indicates that the activities of global banks are correlated with the capital inflows into our sample of emerging countries. This is to be expected since more activity from global banks, namely lending practices, are likely be correlated with higher capital inflows in economies. We use this as a benchmark for comparison.

In the same column [1], we see a change to the coefficient on interoffice when interacted with the time dummy [Interoffice * 2010]. This coefficient is also highly significant, but shows a negative coefficient, indicating that the general trend in emerging economies became less sensitive to global banking activities after 2010. This signifies a general change in capital inflows to emerging economies, which could be due to a change in attitude by EMEs towards volatile capital flows after global discussions of macroprudential policies.

Looking at the control variables, the coefficient on RER is also highly negative and significant, signifying that the real exchange rate is negatively correlated to the capital flows. The negative coefficient on exchange rate signifies the appreciation of local currency. When the local currency appreciates against the dollar, more capital flows into that country. This is a common situation when borrowers from local banks have a currency mismatch, as shown in Bruno and Shin (2014). When the local currency appreciates, the borrowers' balance sheets are stronger, which reduces the credit risk on the bank's loan book. This ultimately increases the capacity of local banks to lend, which is financed by more capital inflows.

Column [2] reports the coefficient estimates for the interaction terms with the interoffice variable. In addition to the time proxy, I added another dummy variable of the five countries that experienced the Asian financial crisis, Indonesia, Korea, Malaysia, Philippines, and Thailand. The interoffice and all dummy interaction terms were highly significant. The signs of the coefficients to both [Interoffice] and [Interoffice * 2010] were the same as column [1] and highly significant, demonstrating the same trend for interoffice assets on capital flows before and after 2010. However, when looking at the coefficients with the AFC dummy variable, there is a change in coefficients.

The coefficient on interoffice interacted with the AFC dummy variable [Interoffice * AFC] is negative, signifying net interoffice assets to be less sensitive to push factors compared to other emerging economies. However, when adding the time dummy variable represented by [Interoffice * AFC * 2010], there is a positive coefficient, demonstrating that the countries that experienced the Asian financial crisis became more sensitive to global factors after 2010.

This produced an outcome very different from my predictions, which led me to look further at country-level data. The following table (Table 3) presents the second set of panel regressions, looking at interaction dummies by specific countries. Again, I focused on the

same [Interoffice] variable as the main global factor capturing the funding activities of global banks. I use the same time proxy represented by the dummy variable [2010], and instead of using the AFC dummy variable for the entire group, I create individual dummy variables for the country: Indonesia [IND], Korea [KOR], Malaysia [MAL], Philippines [PHL], and Thailand [THA].

First, we notice that the coefficients on interoffice and interoffice interacted with the time dummy are all significant. All coefficients to interoffice are significant and positive, while the interoffice variable interacted with the time proxy are significant and negative. This reaffirms our earlier findings. However, the only coefficients on interoffice and its country level interaction terms that are significant at a 5 percent confidence level are in Indonesia and Korea; Malaysia, Philippines and Thailand were not significant when interacted with individual country dummy variables. Indonesia and Korea show opposite directions in the coefficients.

For Indonesia, when interoffice is interacted with the country dummy [Interoffice * IND], the coefficient is highly significant but negative. When this coefficient is further interacted with the time dummy, representing post 2010 figures, [Interoffice * IND * 2010], it is highly significant and positive. Korea, on the other hand, shows opposite signs. The coefficient of interoffice interacted with the country dummy [Interoffice * KOR] is positive, but when it is interacted with the time dummy variable [Interoffice * KOR * 2010] the coefficient is negative.

These country level findings affirm the results of the Bruno and Shin (2014) paper that observed the macroprudential policies, specifically looking at the case of Korea. More analysis on this will follow in the next section.

Discussion

First, the results from the baseline regression came out as expected. It exhibited a positive correlation between net interoffice assets and capital flows, but a negative correlation when paired with the time dummy variable. This suggests that following 2010, with the introduction of macroprudential measures, capital flows slowed in emerging market economies and these economies became less sensitive to the global “push” factor.

However, when analyzing next regression which paired the independent variable from the interactive term AFC countries, there was the opposite relationship from what was expected. When the coefficient on interoffice interacted with the AFC dummy variable, the coefficient was negative; and when it was further interacted with the time dummy variable, the coefficient was positive. The sensitivity to global liquidity conditions actually increased after 2010. In order to understand the breakdown of the situation, I added a country-level dummy variable to do a more thorough analysis.

On a country-level basis, we again focus on the [Interoffice] variable and the results are fascinating. Korea came out as predicted in the hypothesis, demonstrating a negative coefficient, but positive when paired with the time dummy variable [Interoffice * KOR * 2010]. On the other hand, Indonesia shows the opposite correlation with a positive coefficient on the triple interaction term [Interoffice * IND * 2010], meaning that it became *more* sensitive to fluctuations in global bank funding conditions after 2010. In the other cases, the coefficients were insignificant, rather than being negatively significant as we expected.

Korea’s findings came out consistent with the findings of Bruno and Shin (2014), which concludes that Korea was successfully able to lower its sensitivity to global liquidity conditions after 2010. However, in contrast, other ASEAN countries were not able to do the same. While my paper is consistent with Bruno and Shin’s (2014) analysis, some limitations to this study could have affected the empirical results. For one, designating 2010 as a time

dummy variable for implementation of macroprudential policy has its limitations because not all countries implemented these measures at the same time. While this time dummy variable focuses on major global conferences like the Basel Accord to represent a general global atmosphere and change, it has limits in looking at country-level policy effects. It will be valuable to look at individual country-level macroprudential policy implementation to do a more thorough analysis on the country-level effects of this policy.

Additionally, more sensitivity tests and robustness checks have to be conducted in order to more accurately analyze and strengthen these findings. Rather than taking the results for face value, conducting numerous tests to verify the results is necessary as a next step.

On a broader level, the findings in this paper reinforce a number of implications. The results demonstrate that the driving force behind capital flows is through the interaction of the supply and demand of wholesale bank funding. The cross-border spillovers in the financial sector highlight the importance of international coordination in banking regulation and economic policy. Despite the international community coming together to reduce systemic risk, coordination is not straightforward by any means in both design and implementation, even when the interests of countries are the same. In this context, this paper hopes to provide a very preliminary look on the effects of these policies in a small number of emerging economies.

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