

Submitted, 11-Nov, 2016

Financial Crises, Asian Banks and NPLs with Macro-financial linkages

Junkyu Lee, Ph. D

ADB

11 November, 2016

Disclaimer: the views expressed in this presentation are those of the author and do not necessarily reflect the views or policies of the Asian Development Bank. Please do not quote or circulate without permission.

Contents

GFC, Risks, Banks and NPLs

Asian NPLs

Literature Review

Empirical Analysis

Policy Implications and Conclusion

1. Global Financial Crisis, Risks Concentrated and Accumulated, Banks and NPLs

Lessons of the Global Financial Crisis

- causes
 1. Financial regulation was not equipped to see the risk concentrations and flawed incentives behind the financial innovation boom
 2. Macroeconomic policies failed to take into account the build-up of systemic risks in the financial system and in housing markets
 3. Global architecture failed to see growing vulnerabilities and links

2. Asian NPLs

Since the aftermath of the 1997/8 Asian financial crisis, NPL ratios have been trending downwards in Emerging Asia...

Table 1: NPL Ratio in Emerging Asia, 2015

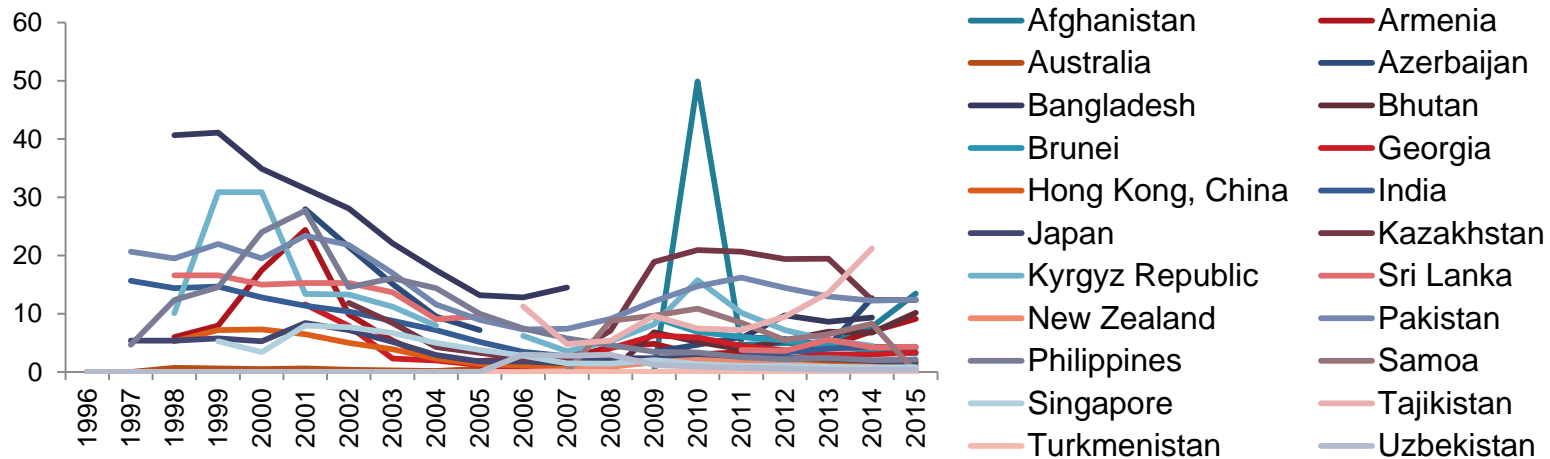
Country	NPL Ratio (%)	Year	Country	NPL Ratio (%)	Year
Below 5%			5% to below 10%		
Turkmenistan	0.01	2014	Samoa	5.3	2015
Brunei Darussalam	0.4	2015	India	5.9	2015
Uzbekistan	0.4	2015	Kyrgyz Republic	7.1	2015
Korea, Republic of	0.6	2014	Armenia	7.9	2015
New Zealand	0.6	2015	Kazakhstan	8.0	2015
Hong Kong	0.7	2015	Bangladesh	9.3	2015
Singapore	0.9	2015	Above 10%		
Australia	1.0	2015	Pakistan	11.4	2015
PRC	1.5	2015	Bhutan	11.9	2015
Cambodia	1.6	2015	Afghanistan	12.3	2015
Japan	1.6	2015	Maldives	14.1	2015
Malaysia	1.6	2015	Tajikistan	19.1	2015
Fiji	1.8	2015			
Philippines	1.9	2015			
Georgia	2.7	2015			
Thailand	2.7	2015			
Vietnam	2.9	2014			
Sri Lanka	3.2	2015			
Solomon Islands	4.1	2015			
Azerbaijan	4.9	2015			

Source: World Development Indicators

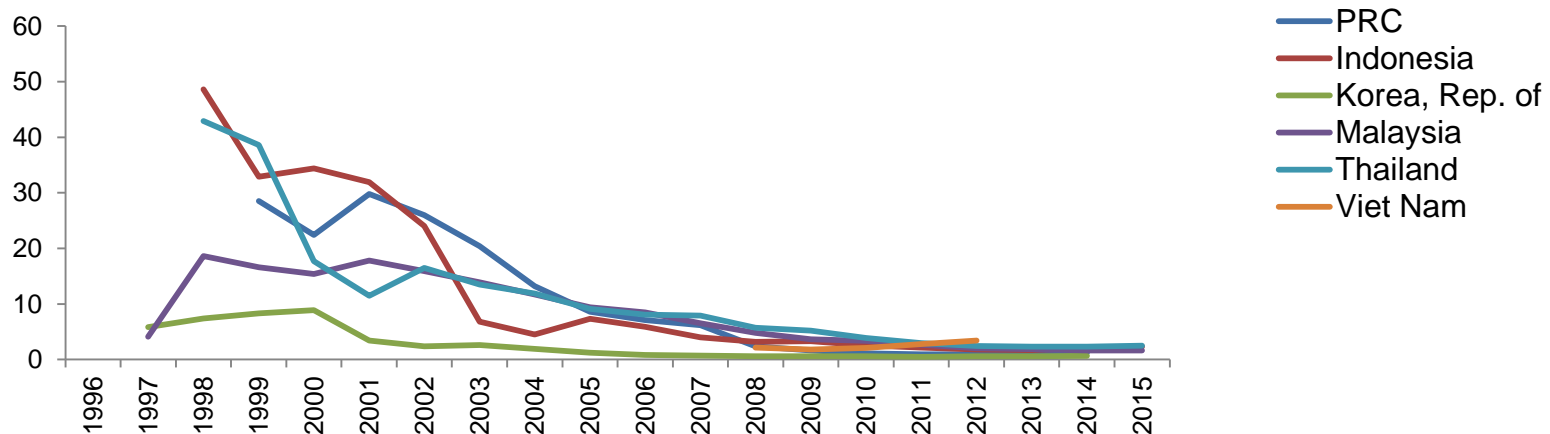
- In 2015, **NPLs account for less than 5.0 percent** of all gross loans across the region.
- This improvement is attributed to **stronger growth in nominal incomes and credit** and increasing financial inclusion (RBA, 2014).

Efforts of supervisory authorities in the region to improve banks' credit risk management and underwriting practices have also helped subdue NPLs...

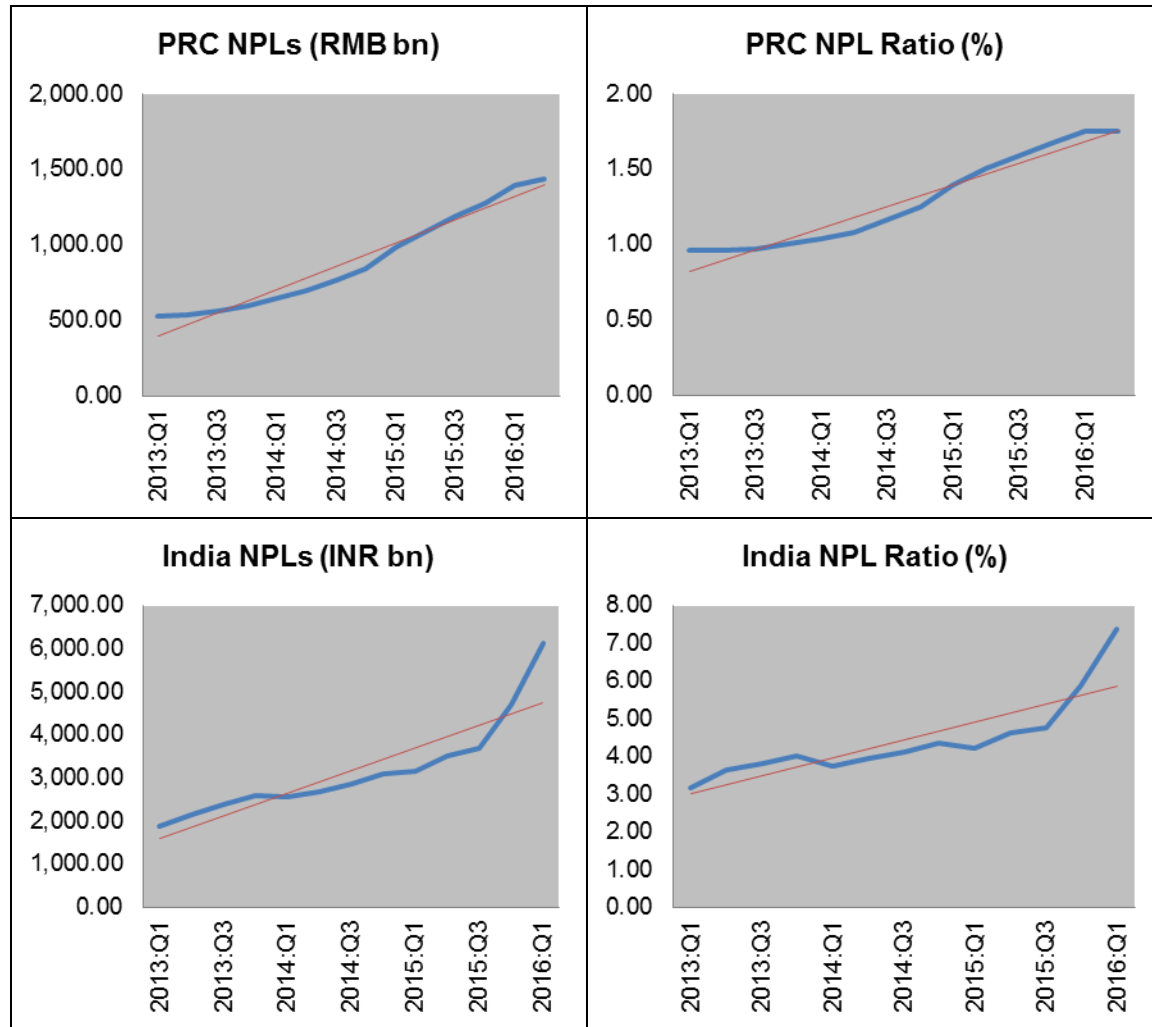
NPL ratio of Asian economies without public AMC or with limited roles of public AMCs



NPL ratio of Asian economies with active roles of public AMCs

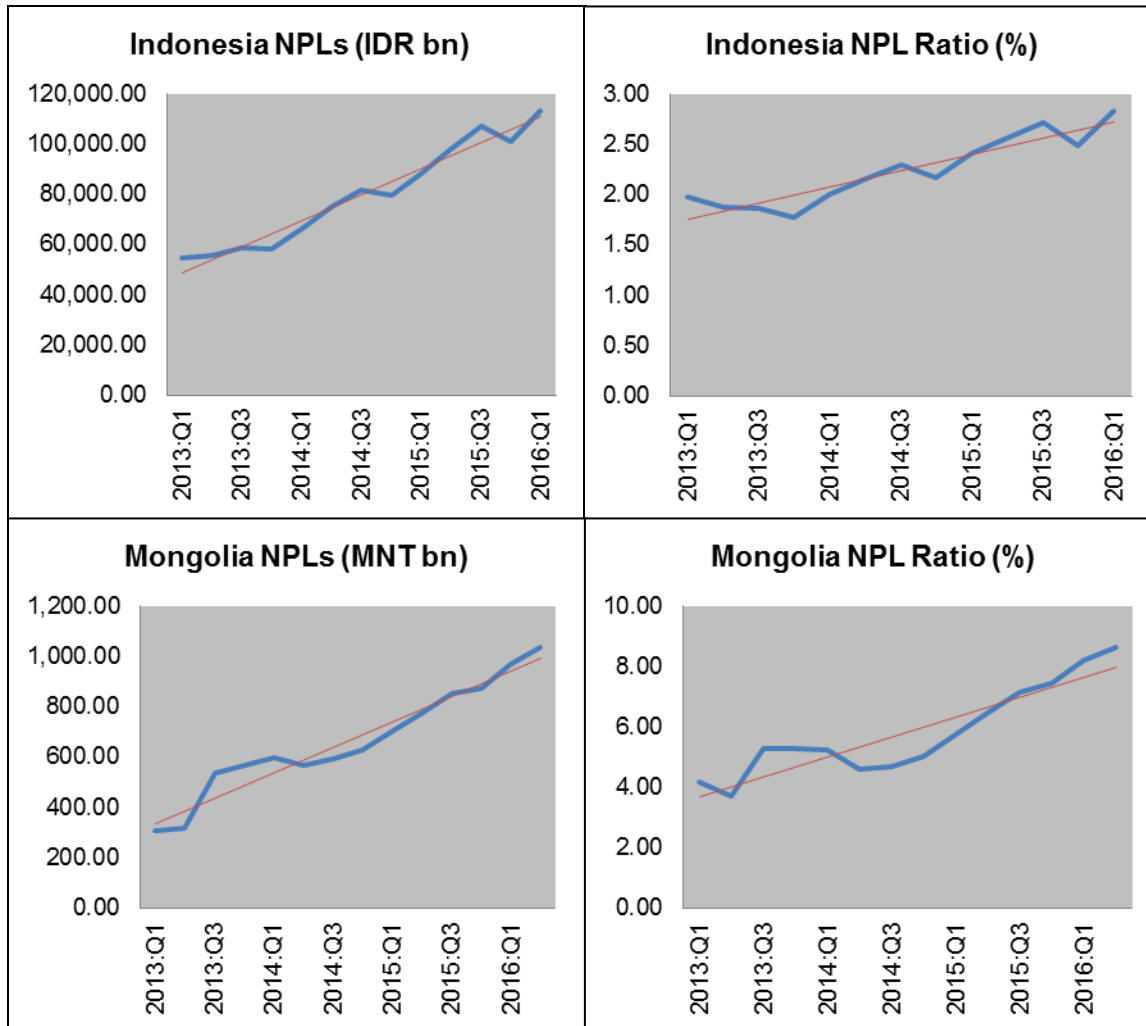


Asset qualities of Asia's banking systems still remain a concern



- Since 2013, NPLs—both in levels and as percent of total loans—have been picking up in developing economies in the region, PRC, India, Indonesia, Mongolia, and Thailand.

...and a trend reversal in NPLs may precipitate the macro-financial implications in Asia

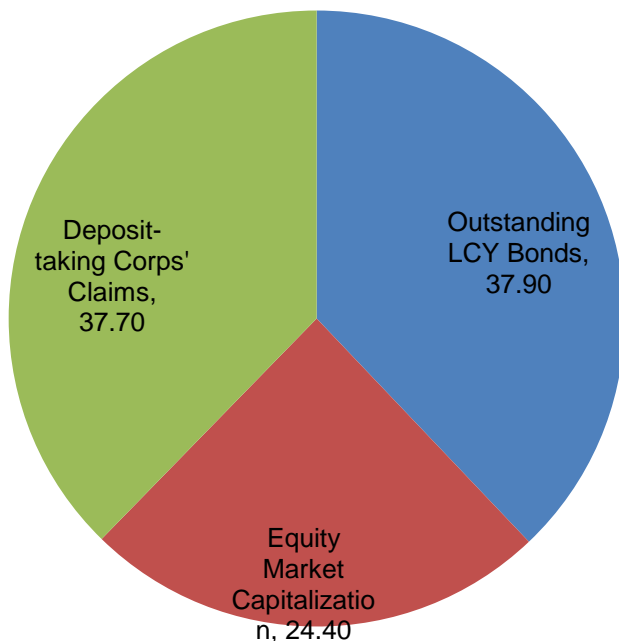


- Moreover, NPL ratios in 2015 registered more than 5.0 percent in a number of countries in the region, most notable of which include Mongolia, Pakistan, Bhutan, Afghanistan, Maldives, and Tajikistan.
- Some of them had bad loans accounted for more than 10.0 percent of gross loans .

3. Banks in Asia and implications of NPLs

banks are a critical segment of Asia's financial markets...

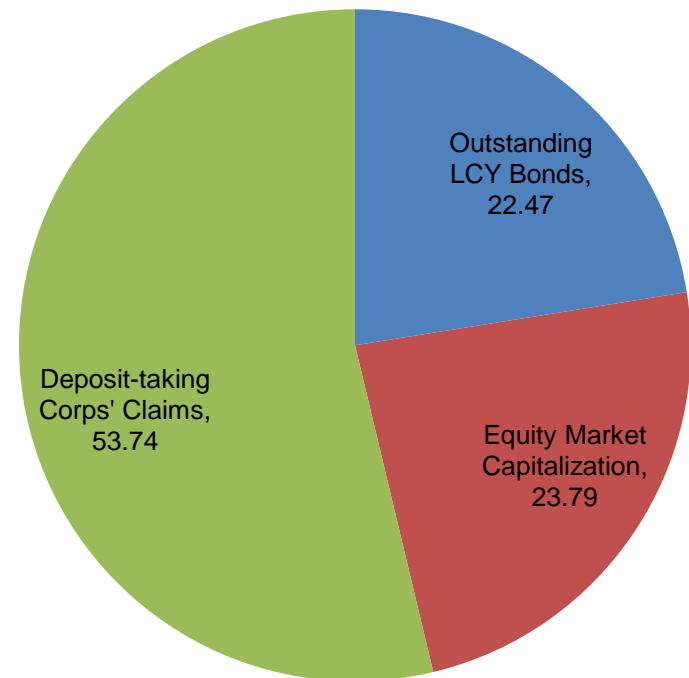
% share of each financial segment in their combined credit resources, 2007, Asia-11



Asia 11 includes People's Republic of China; Hong Kong, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Philippines, Singapore, Taipei, China, and Thailand.

Data sources: International Finance Statistics, IMF; Bloomberg World Market Capitalization; AsianBondsOnline, ADB; Central Bank of the Republic of China (Taiwan); Securities and Exchange Board of India; Department of Economic Affairs, Government of India

2014



Asia 11 includes People's Republic of China; Hong Kong, China, India, Indonesia, Japan, Republic of Korea, Malaysia, Philippines, Singapore, Taipei, China, and Thailand.

Data sources: International Finance Statistics, IMF; Bloomberg World Market Capitalization; AsianBondsOnline, ADB; Central Bank of the Republic of China (Taiwan); Securities and Exchange Board of India; Department of Economic Affairs, Government of India

Banks are a critical segment of Asia's financial markets

1. **Shocks to the banking system** that hamper the sector's functions resulted to freezing of credit channel and slowing down of economic activities. In extreme cases, such episodes **will lead to surge in unemployment rate and poverty incidence.**
2. The Asian Financial Crisis (AFC) in 1997/98, the Global Financial Crisis (GFC) in 2008, and the more recent European Sovereign Debt and Banking Crisis (EDC) are grim reminders of the **impact of troubled banking system and distressed debts.**
3. **Banking and financial troubles** are almost always accompanied by an **unusual surge in nonperforming assets (NPA)** or nonperforming loans (NPL).

Contents

Introduction

Literature Review

Empirical Analysis

Policy Implications and Conclusion

The existing studies reveal some caveats in the existing literature...

caveat1

- Most Asian studies place **greater importance on the role of macroeconomic conditions in determining NPLs as opposed to bank-specific factors**, and they perform the analysis using **aggregate/country-level data**.

caveat2

- Second, there is a limited number of Asian studies which attempt to model the **persistence of NPLs as well as its feedback effects**.

caveat3

- Lastly, there is no attempt to control for **structural changes such as the 1997/8 Asian financial crisis and the global financial crisis**.

Contents

Introduction

Literature Review

**Empirical Analysis: Determinants
of NPLs in Emerging Asia**

Policy Implications and Conclusion

Data

- This paper uses panel data of **individual banks' balance sheets** from *Bankscope* and macroeconomic indicators from CEIC. The sample covers **annual data for 1995-2014**. Bank-level data consists of **165 commercial banks in 17 countries** in Emerging Asia.
- The data set covers more than 60 percent of the banking sector's assets in most of the countries in the sample

Table 2: Share of the Banks to Commercial Bank Total Assets

Country	Number of Banks	% of Total Assets
Bangladesh	20	78.32
Georgia	8	91.13
Hong Kong	3	58.28
India	14	71.96
Indonesia	12	71.10
Japan	13	56.30
Kazakhstan	8	71.39
Kyrgyz Republic	2	43.15
Malaysia	13	89.66
Pakistan	9	79.16
Philippines	5	67.62
PRC	9	52.42
Singapore	2	53.83
South Korea	12	72.43
Sri Lanka	9	86.97
Thailand	15	85.70
Vietnam	10	63.73

Source: *Bankscope*, ADB calculations

Data

- Bank-level data all taken from *Bankscope* include
 - **NPL ratio** (ratio of impaired loans to gross loans; npl denotes the logit transformation of the NPL ratio)
 - **equity-to-assets ratio** (ratio of equity to assets; denoted by $earatio$)
 - **return on equity (ROE)** (ratio of net income to average equity; denoted by roe)
 - **loans-to-deposits ratio** (ratio of gross loans to deposits; denoted by $ldratio$)
 - **loans growth rate** (year-on-year growth rate of loans; denoted by $\Delta loans$);

Data

- Macroeconomic variables all taken from CEIC include
 - **real gross domestic product (GDP) growth rate** (Δgdp)
 - **unemployment rate** (number of unemployed as percentage of total labor force; denoted by $\Delta unemprate$)
 - **exchange rate** (value of local currency per U.S. dollar denoted by $exrate$; an increase in the exchange rate means depreciation of the local currency)
 - **inflation rate** (inf)
 - a measure of global risk aversion which is the **Standard & Poor's 500 stock market index (VIX)** (denoted by vix) taken from the Bloomberg database.
- We use Fisher-type panel unit root tests (Choi, 2011) to determine the stationarity of the variables. The panel unit root tests using both augmented Dickey-Fuller and Phillips-Perron tests reveal that all variables are stationary

Dynamic Panel Data (DPD) Model

- We estimate the following DPD model:

$$y_{i,t} = \rho y_{i,t-1} + \alpha B_{i,t-1} + \beta C_{i,t} + \gamma G_t + \varepsilon_{i,t},$$
$$\varepsilon_{i,t} = u_i + e_{i,t},$$

- where the dependent variable $y_{i,t}$ denotes the **logit transformation of the NPL ratio** for bank i at year t .
- The regressors : $B_{i,t-1}$ denotes the vector of **lagged bank-level variables** ($earatio, roe, ldratio, \Delta loans$); C_t which denotes the vector of **country-specific macroeconomic indicators** ($\Delta unemprate, inf, exrate, \Delta gdp$); and G_t which represents the vector of **global variables** ($vix, dummy_afc$) where $dummy_afc$ is an event dummy variable to control for the **Asian financial crisis in 1998**.
- The term $\varepsilon_{i,t}$ denotes the composite error term consisted of bank fixed effects u_i and the idiosyncratic term $e_{i,t}$.

Results and Discussion

Table 7: NPLs: Macroeconomic and Bank-Level Determinants, 1995-2014

	Fixed Effects			Difference GMM			System GMM		
<i>npl</i> ₋₁	0.671***	0.689***	0.697***	0.685***	0.708***	0.708***	0.851***	0.804***	0.812***
Macroeconomic variables									
Δ <i>unemprate</i>	0.131***	0.129***	0.129***	0.125***	0.140***	0.135***	0.104***	0.126***	0.122***
<i>inf</i> ₋₁	0.006	0.010**	0.010**	0.006	0.009***	0.008***	0.017***	0.019***	0.018***
<i>exrate</i>	0.00005*	0.000	0.000	0.00002	0.00003**	0.00003**	0.000	0.000	0.000
Δ <i>gdp</i> ₋₁	-0.015**	-0.017***	-0.017***	-0.014***	-0.015***	-0.015***	-0.008**	-0.011***	-0.011***
<i>vix</i>	0.008***	0.007***	0.006***	0.006***	0.005***	0.004***	0.006***	0.005***	0.005***
<i>dummy_afc</i>			0.383***			0.266***			0.306***
Bank-level variables									
<i>earatio</i> ₋₁		-0.004*	-0.005		0.005	0.005		-0.011***	-0.011***
<i>roe</i> ₋₁		-0.001*	-0.002*		0.002	0.002		-0.001***	-0.0007**
<i>ldratio</i> ₋₁		0.001***	0.001***		0.001*	0.001*		0.001***	0.001***
Δ <i>loans</i> ₋₂		0.0005***	0.0004***		0.001***	0.001***		0.0006***	0.0006***
No. of obs	1,996	1,770	1,774	1,831	1,686	1,686	1,996	1,764	1,764
R ² (within)	0.534	0.540	0.546						
R ² (between)	0.801	0.967	0.963						
No. of banks	165	165	165	165	165	165	165	165	165
No. of instruments				22	81	81	24	96	96
Hansen test				0.136	0.467	0.467	0.899	0.496	0.496
A-B AR(1) test				0.000	0.000	0.000	0.000	0.000	0.000
A-B AR(2) test				0.398	0.278	0.278	0.401	0.306	0.306

Significance level: ***p < 0.01; **p < 0.05; *p < 0.10

Results and Discussion

- The results reveal that **both macroeconomic indicators as well as bank-level variables play a key role in explaining the evolution of banks' NPL ratio**, and this finding appears to be consistent across all model specifications and across the three alternative estimation approaches.
- Holding bank-level and macroeconomic indicators fixed, **banks' asset quality deteriorated to a large extent during the outbreak of the Asian financial crisis in 1998**, and this increase in banks' NPL ratios is both practically and statistically significant in all the estimation approaches.
- **Banks' NPL ratios exhibit strong serial correlation.** The estimated coefficient of the lagged dependent variable ranges **between 0.6 and 0.9**, suggesting that a shock to NPLs is predicted to have dynamic effects on the banking system.

Contents

Introduction

Literature Review

**Empirical Analysis: Feedback
Effects of NPLs**

Policy Implications and Conclusion

Data: feedback effects of NPLs

- This section uses panel data of **country-level macroeconomic indicators covering annual data for 1994-2014 for the following 32 countries** in Emerging Asia.
- The following country-level data on macroeconomic variables all taken from CEIC are used:
 - **NPL ratio** (*nplr*) defined as the ratio of non-performing loans to total loans of the country's overall banking system taken from **Bankscope**, **change in NPL ratio** ($\Delta nplr$),
 - **loans growth rate** defined as the year-on-year growth rate of loans of overall banking system taken from Bankscope,
 - **real gross domestic product (GDP) growth rate** (Δgdp),
 - **unemployment rate** defined as the number of unemployed as percentage of total labor force ($\Delta unemp$), **change in the unemployment rate** ($\Delta unemp$),
 - **policy rate** (*policyrate*) and its **change** ($\Delta policyrate$),
 - and **inflation rate** (*inf*) defined as the year-on-year growth rate of the consumer price index (CPI) and its **change** (Δinf)

Panel Vector Autoregressive Model (PVAR)

- To investigate the feedback effects of Asian NPLs to the real economy, we estimate the following **panel vector autoregression (VAR) model**:

$$Y_{i,t} = \Pi_0 + \sum_{j=1}^n \Pi_j Y_{i,t-j} + \varepsilon_{i,t},$$
$$\varepsilon_{i,t} = u_i + e_{i,t}$$

- where $Y_{i,t}$ is the vector of endogenous variables, $\varepsilon_{i,t}$ is the composite error term consisted of the country fixed effects u_i and idiosyncratic errors $e_{i,t}$.
- In our baseline specification, $Y_{i,t}$ consists of four endogenous variables, namely **$nplr_{i,t}$, $\Delta loans_{i,t}$, $unemp_{i,t}$, and $policyrate_{i,t}$** , where subscript i and t denotes country i and year t , respectively.

Impulse Response Functions (IRFs) Analysis

- To assess the dynamic behavior of the model, we present the **orthogonalized impulse response functions (IRFs)**. The IRFs summarize the response of one variable in the system to a shock in another variable in the system while holding other innovations fixed.
 - *Response of NPLs to shocks in macroeconomic variables.* **Higher GDP growth and credit supply both decrease Asian NPL ratio, while tighter monetary policy and rising unemployment both increase Asian NPL ratio.**
 - *Response of macroeconomic variables to a shock in NPL ratio.* **Rising Asian NPL ratio decreases GDP growth, credit supply, and policy rate, and it increases unemployment.**

Stylized Facts and Features of NPLs

- Macroeconomic variables
- Financial variables
- Institutional/legal factors
- NPLs play a key role in credit market frictions and macro-financial vulnerability
- A sharp increase in NPL triggers long-lived tailwinds that impede macroeconomic performance
- NPL is an indicator to identify the credit market risks

Contents

Introduction

Literature Review

Empirical Analysis

**Policy Implications and
Conclusion**

NPL Ratios in Asia, US, and EU

- Developing Asia (according to the WDI):

- **Out of 48 ADB member economies, only 28 have NPL ratio data.**

- **Of which, 11 economies have NPL ratio above 5 percent in 2015.**

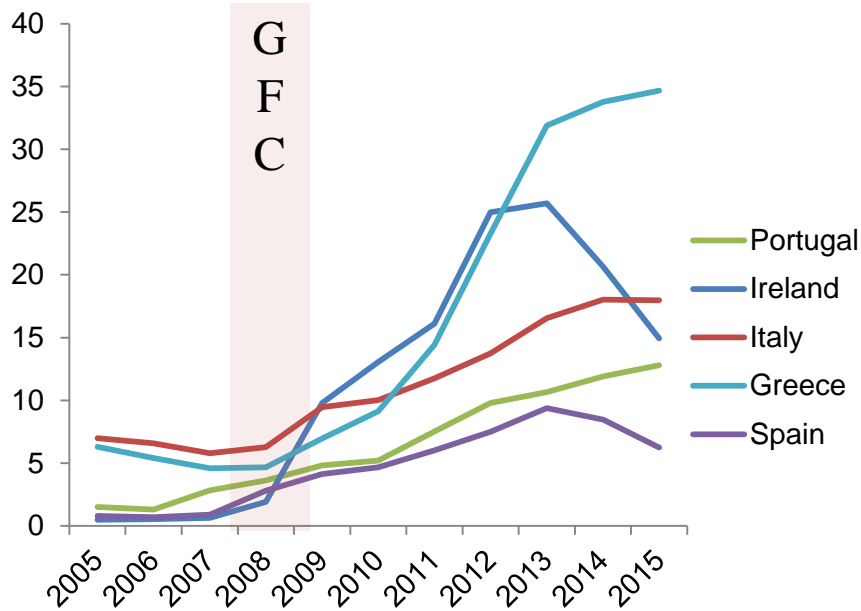
- EU (according to WDI):

- **13 out of the 28 economies have NPL ratio above 5 percent in 2015.**

Country	NPL Ratio (%)	Country	NPL Ratio (%)
Tajikistan	19.1	Cyprus	45.6
Maldives	14.1	Greece	34.7
Afghanistan	12.3	Italy	18.0
Bhutan	11.9	Croatia	16.3
Pakistan	11.4	Ireland	14.9
Bangladesh	9.3	Portugal	12.8
Kazakhstan	8.0	Romania	12.3
Armenia	7.9	Hungary	11.7
Kyrgyz Republic	7.1	Slovenia	10.0
India	5.9	Malta	9.4
Samoa	5.3	Spain	6.3
US	1.5	Lithuania	5.7
		Czech Republic	5.6

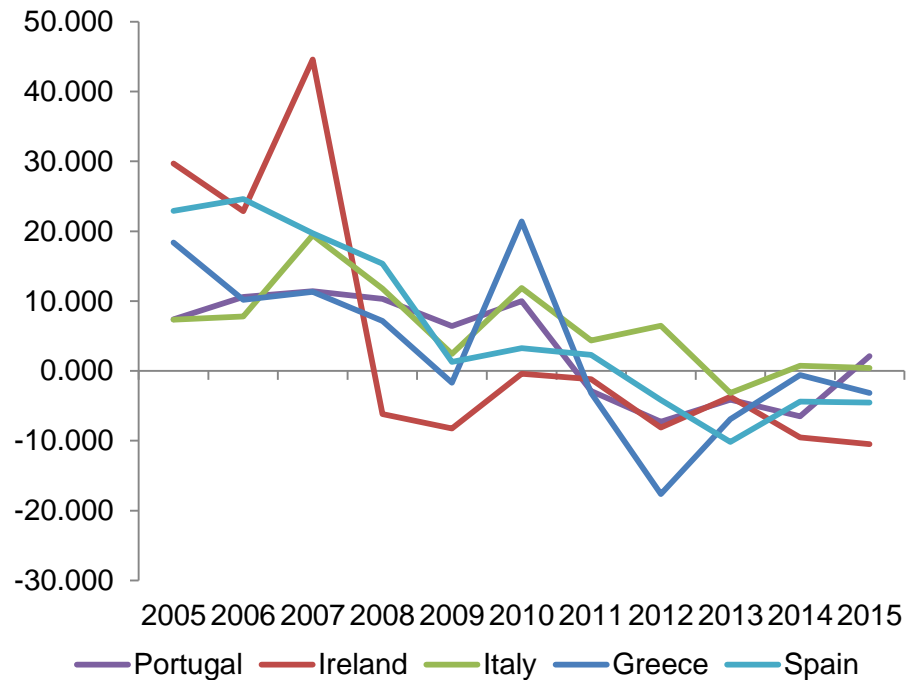
NPL Ratio and Loan Growth: Selected European Economies, such as Portugal, Ireland, Italy, Greece, Spain

NPL Ratio



Source: World Development Indicators, World Bank. Data is annual.

Loan year-on-year growth rate



Source: CEIC; data is annual.

Food for Thought

- Crises lessons, financial vulnerability, NPLs macro-financial linkages,
- Financial integration, contagion and spillovers
- Financial safety nets, Resolution mechanisms
- Roles of Public AMCs, Deposit Insurance System
- AFC experience, recent European experience
- Legal and institutional factors to deal with NPLs in individual country context