Non-performing loans and Financial Development: New Evidence

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Abstract

This study examines the relationship between country-level non-performing loans (NPLs) and financial development. In the full country analysis, the findings indicate that financial development measured as private credit to GDP ratio is positively associated with NPLs. Also, NPLs are inversely associated with bank efficiency, loan loss coverage, banking competition and banking system stability; and is positively associated with foreign bank presence, banking crises and bank concentration. We also find that efficient and stable banking sectors experience higher NPLs. In the regional analysis, NPLs are observed to be negatively associated with regulatory capital and bank liquidity while the graphical analysis show that NPLs are inversely related to financial development and profitability across regions. The findings have implications.

JEL Classification Code: E44, G01, G21, G28, G32, F34, O16

Keywords: Non-performing loans; financial development; banking crisis; foreign banks; financial intermediation; credit risk

1. Introduction

Non-performing loans reflect the credit quality of the loan portfolio of banks, and in aggregate terms, reflect the credit quality of the loan portfolio of the banking sector of a country or region. For most countries, aggregate non-performing loans were relatively low prior to the 2008 global financial crisis but increased significantly during and after the 2008 financial crisis[1], compelling bank supervisors/regulators in several countries to intervene to deal with the rising non-performing loans in the banking sector. Despite the formulation of several policy design intended to mitigate recessionary economic trends that give rise to non-performing loans as well as the imposition of different levels of stringent capital requirements for banks to mitigate risk-taking that increase the risk of non-performing loans in several countries around the world, yet rising non-performing loans remain a major issue which raises serious concern about whether existing policy and regulatory initiatives by bank regulators/supervisors are adequate to mitigate rising non-performing loans.

In this paper, we partly deviate from the macroeconomic argument for non-performing loans and take a different view, which is this: given that non-performing loans are a measure of bank performance (i.e., the lower, the better), could it be that certain financial (sector) development characteristics makes it more probable for the banking sector to experience higher or fewer aggregate non-performing loans? We are interested in explaining this relationship, if any, using country-level data for non-performing loans. Therefore, we investigate the empirical association between non-performing loans and financial development using two datasets: data for 96 countries and data for 6 regions of the world. We use non-traditional NPL indicators to control for bank-level determinants of non-performing loans. Our measures of financial development are private credit by banks to GDP ratio and bank deposit to GDP ratio, and we find that non-performing loans are positively associated with financial development measured as private credit by banks to GDP ratio, implying that banking sectors with greater financial development (via greater financial intermediation) have higher non-performing loans.

This study contributes to the literature on the determinants of NPLs and macro-financial feedback in two ways. One, we focus on the relationship between non-performing loans and financial sector development, an issue that remain unexplored in the extant literature. Two, we use two datasets and combine regional graphical analysis and global empirical analysis to examine the association between NPLs and financial development during the 2003 to 2014 period. Three, we introduce non-traditional banking sector determinants that potentially explain the behaviour of non-performing loans.

From a policy standpoint, our analysis is of interest to policy makers for two reasons. First, our analysis on the relationship between aggregate non-performing loans and financial development is crucial for macro-prudential surveillance and can help policy makers in their evaluation of external factors beyond their control that influence the level of aggregate non-performing loans despite their micro-prudential policy efforts to reduce the size of NPLs. A thorough understanding of this relationship can provide some breakthrough to bank supervisors/regulators in their attempt to identify the causes of rising non-performing loans and how to reduce non-performing loans in the banking sector. Finally, our analysis is relevant for the stress testing of bank loan quality. National bank supervisors should take into account the level of financial sector development in their

[1] See Appendix A1.

stress-test scenarios in order to gain robust stress test results to improve their understanding of what gives rise to non-performing loans in the banking sector.

The remainder of the paper is organized as follows. Section 2 presents the conceptual framework and the literature review on non-performing loans. Section 3 presents a description of the dataset and the econometric methodology used to estimate the relationship between NPLs and financial development. Section 4 discusses the results. Section 5 concludes.

2. Conceptual Framework and Related Literature

2.1. Non-Performing Loans

NPL is an indicator of banks' asset quality, and asset quality is an important indicator of the performance of the banking sector of a country amongst other performance indicators. In aggregate terms, the asset quality of a country's banking sector is determined by its aggregate non-performing loan measured as the ratio of impaired loans to gross loans; however, the definition of non-performing loans will differ across countries[2]. The level of non-performing loans is of serious concern to bank regulators/supervisors due to its role in the failure of several systemic and non-systemic financial institutions around the world particularly during the 2007 to 2008 financial crisis. A closer look at aggregate NPLs across regions confirm that the post-2008 financial crisis era witnessed a significant increase in aggregate NPLs in several regions (See Figure 1) and several banking analysts expect the level of non-performing loans to increase in subsequent years. While micro-level attempts by bank regulators/supervisors to reduce the level of aggregate non-performing loans may involve minimising the level of non-performing loans for individual banks in the country, we also take into account that certain financial (or banking sector) development characteristics/structures in a country can increase or reduce the likelihood of non-performing loans. As can be seen in Figure 2, the graphical analysis below, using regional data, show some association between non-performing loans and financial sector development indicators. As can be observed in Figure 2 to 7, NPLs are inversely related to financial intermediation (private credit to GDP ratio) and size of the banking sector (bank deposits to GDP ratio) for the World, SSA, MENA, LAC and EAP regions while a positive association is observed for the ECA region in the post-crisis period. For all regions, NPLs are inversely related to return on equity (ROE) and return on assets (ROA). Subsequently, we empirically test this observed association to determine whether varying cross-country financial sector development indicators affect the level of aggregate non-performing loans.

[2] see 2012 report on NPLs by the European Banking Coordination "Vienna" Initiative .Available at: http://vienna-initiative.com/wp-content/uploads/2012/08/Full-Forum-Meeting-of-the-European-Bank-Coordination-Vienna-2.0-Initative.pdf

Figure 1: Non-performing loans (by region)

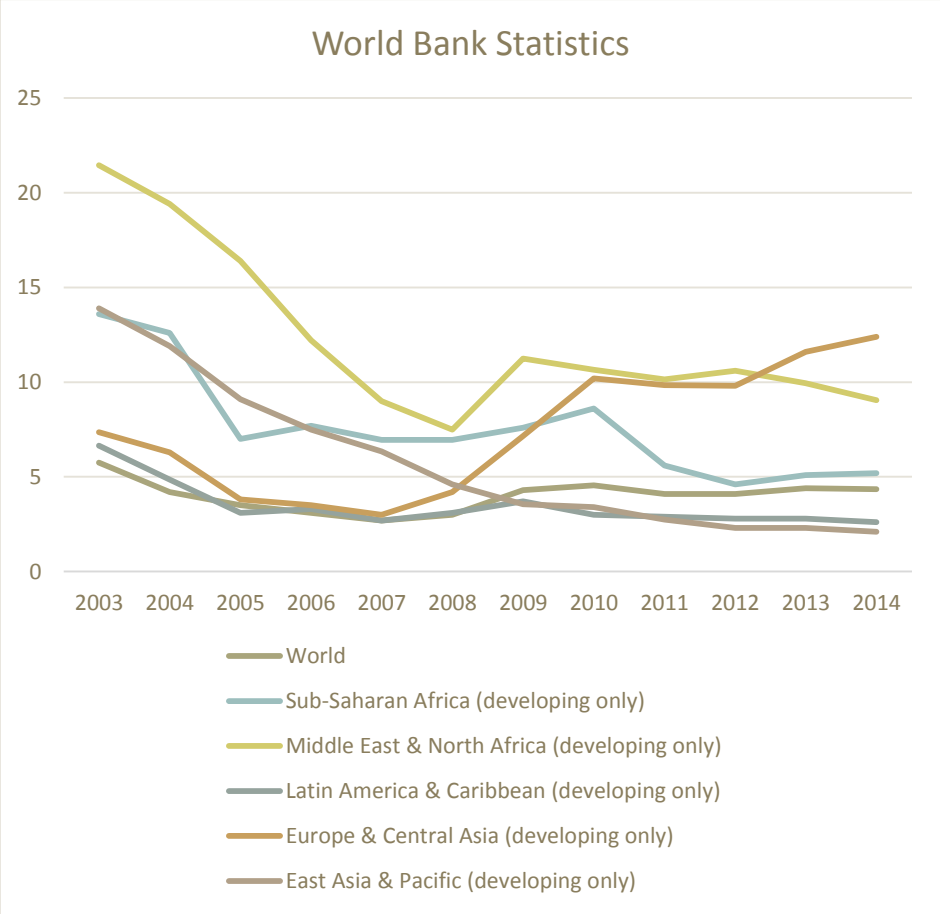


Figure 2: World

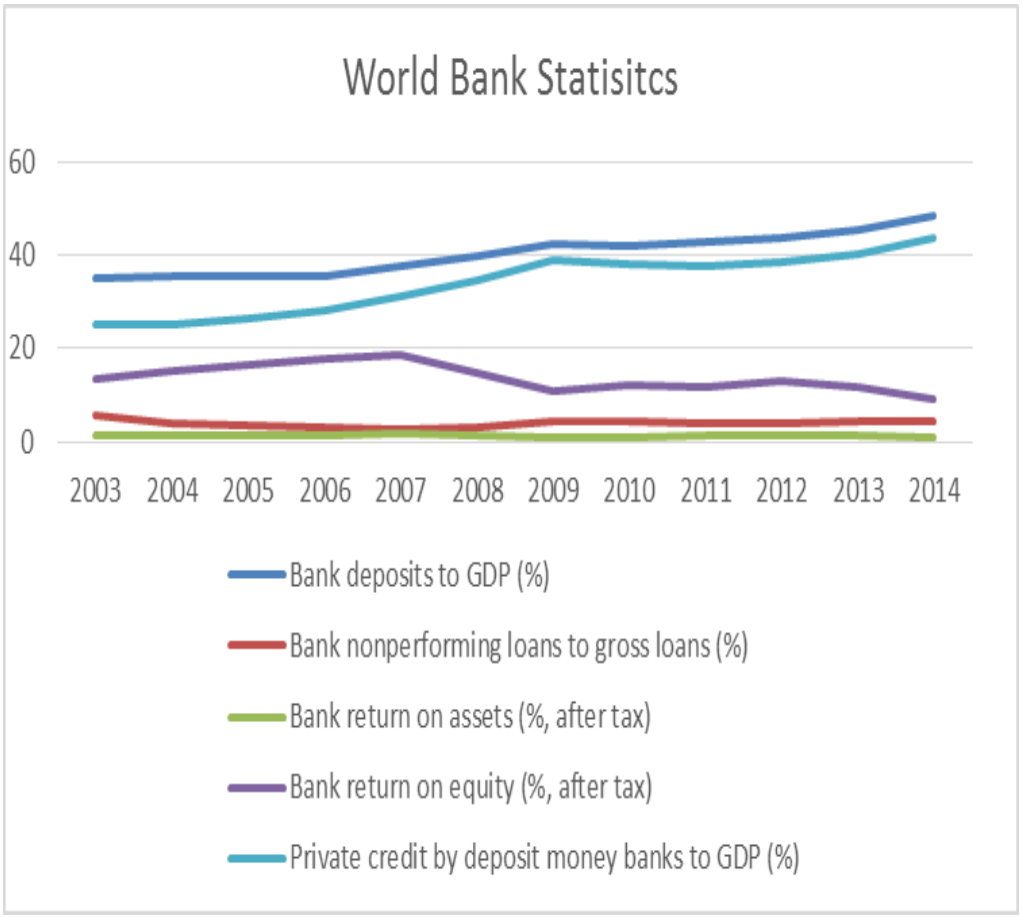


Figure 3: Sub-Saharan Africa (SSA) region

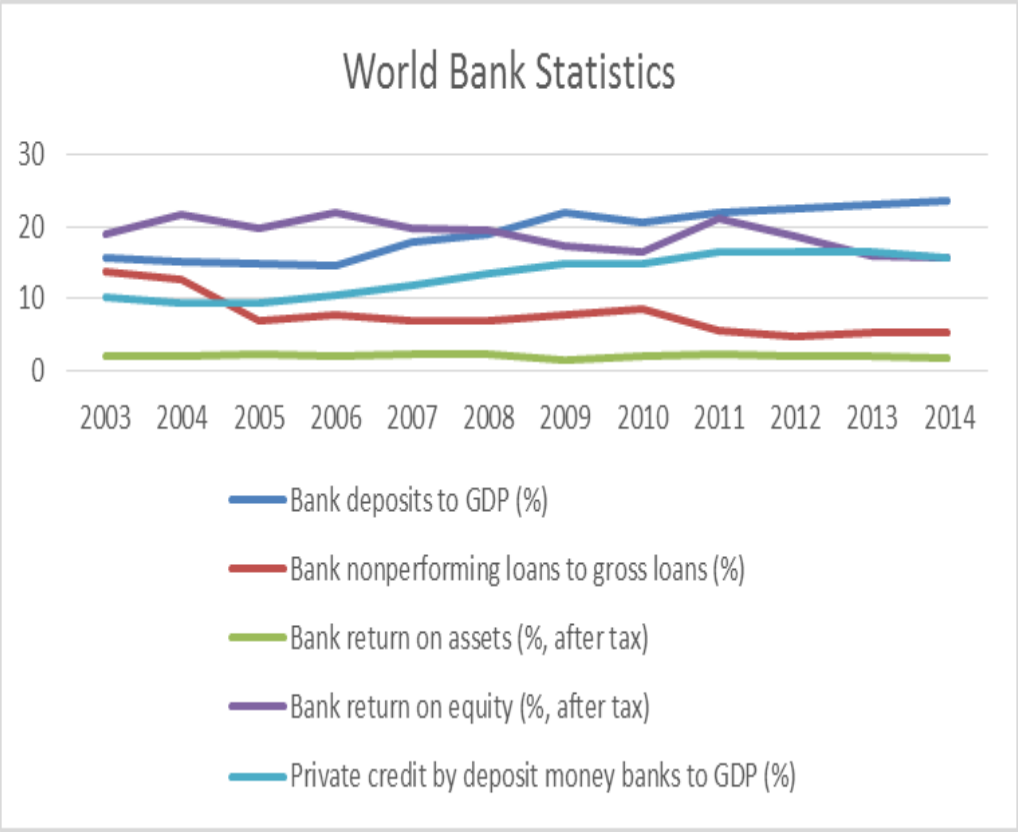


Figure 4: Middle East and North Africa (MENA) region

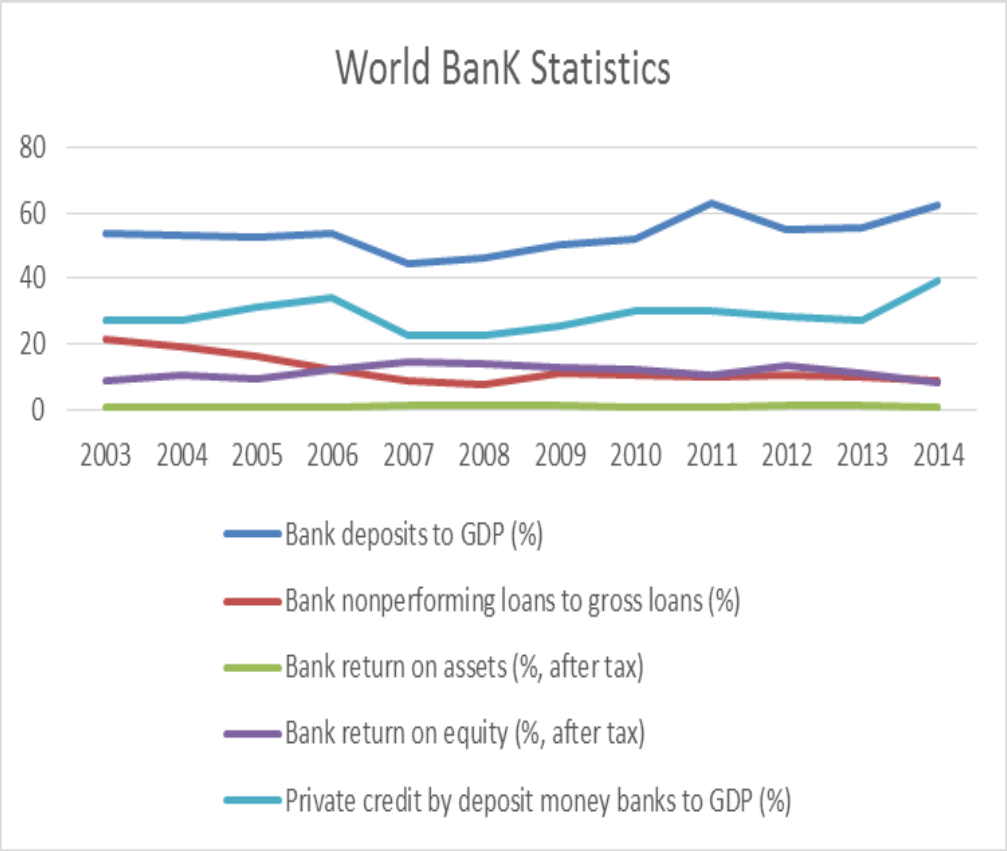


Figure 5: Latin America and Caribbean (LAC) region

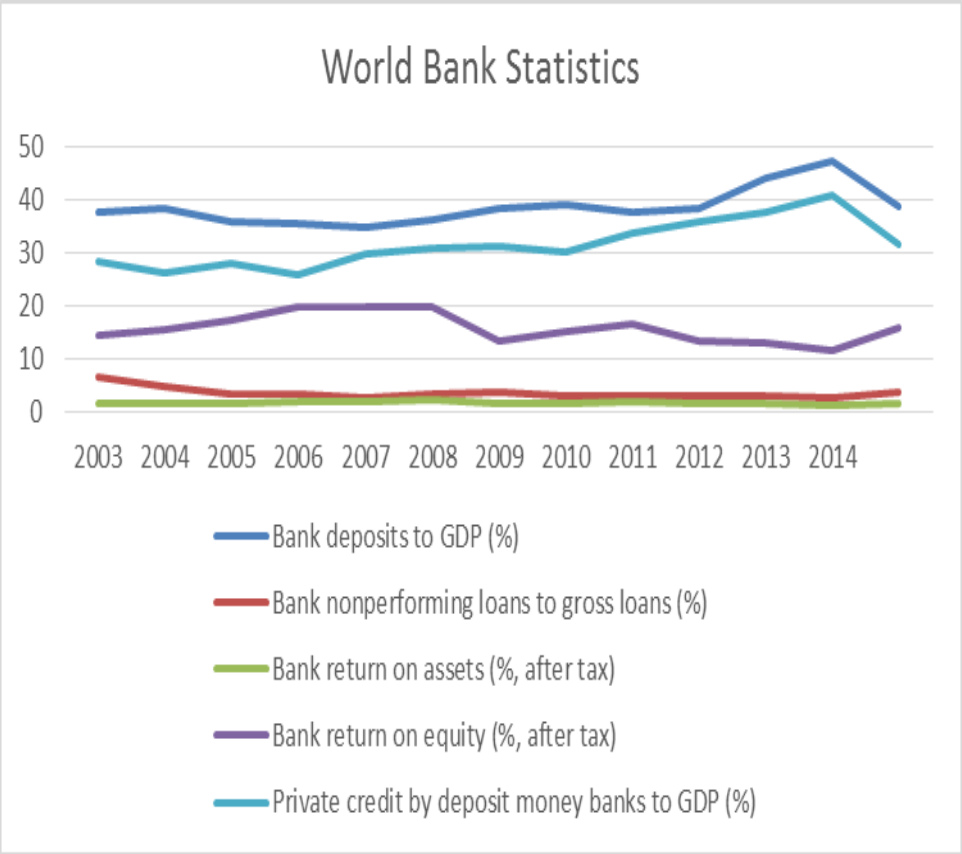


Figure 6: Europe & Central Asia (EAC) region

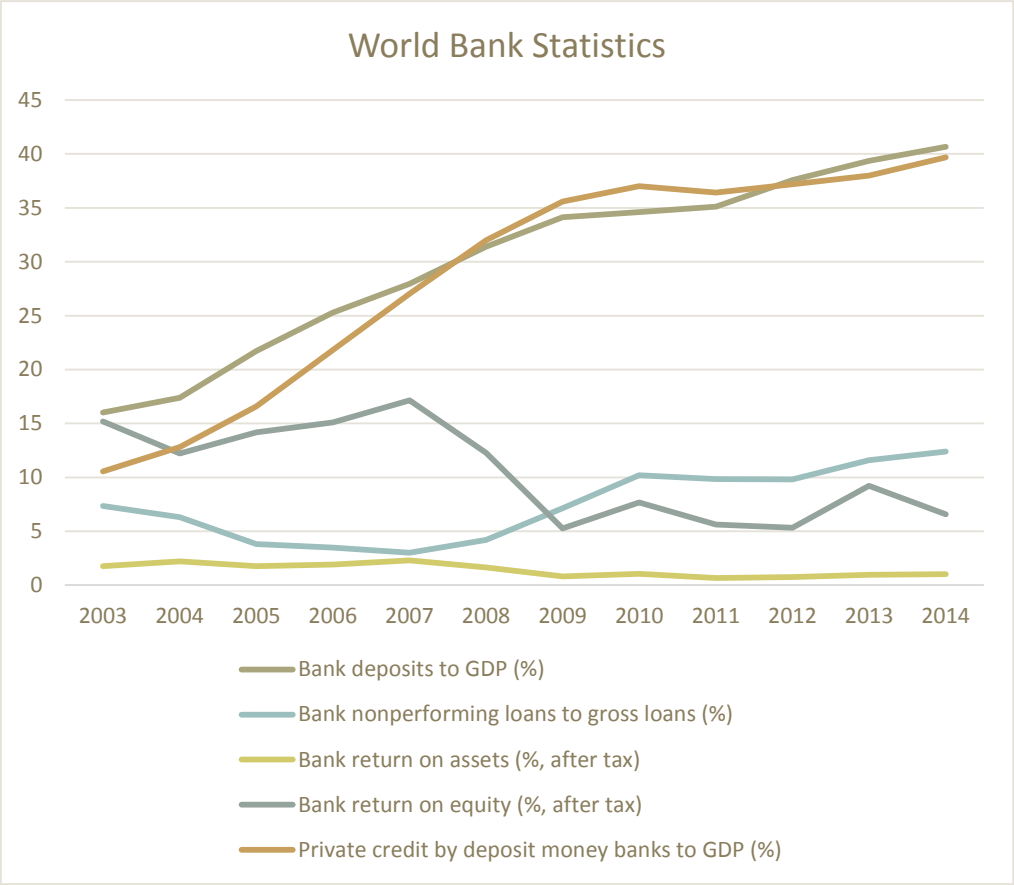
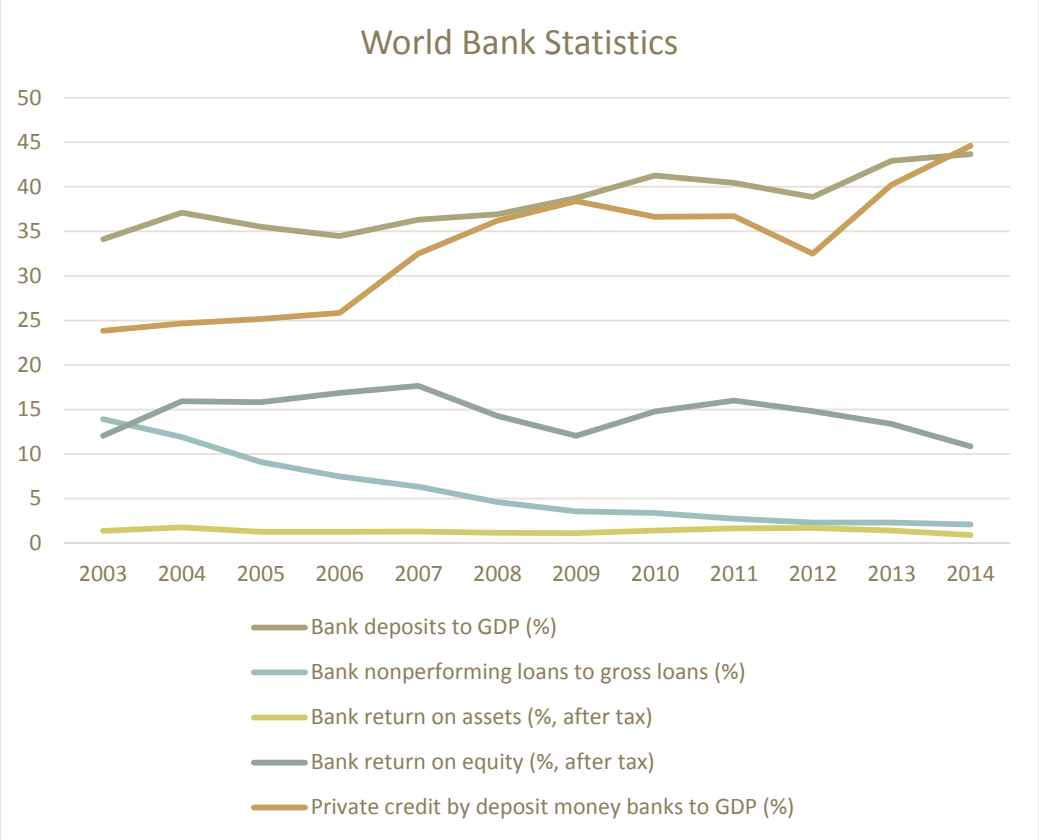


Figure 7: East Asia & Pacific (EAP) region



2.2. Related Literature

The literature on non-performing loans (NPLs) focus extensively on the macroeconomic and bank-level determinants of non-performing loans with little or no focus on the question whether certain financial development influence the level of non-performing loans. For instance, Nkusu (2011) investigate the determinants of non-performing loans across 26 developed countries over the 1998 to 2009 period and find that deteriorating macroeconomic conditions such as: economic growth and higher unemployment led to higher non-performing loans. Klein (2013), using country-level data, investigate 16 CESEE countries over the1998 to 2011 period and find that aggregate NPLs are negatively associated with credit growth, unemployment, gross domestic product growth rate and inflation. Louzis et al (2012) investigate the determinants of non-performing loans (NPLs) in the Greek banking sector for each loan category: consumer loans, business loans and mortgages, and find that non-performing loans are significantly influenced by management quality, GDP, unemployment, interest rates and public debt. Skarica (2014), using country-level non-performing loans data, investigate the determinants of non-performing loans among 7 countries in the Central and Eastern European (CEE) region during the third-quarters of 2007 and 2012 and find that higher non-performing loans are significantly associated with economic slowdown, unemployment and inflation. Beck et al (2015) examine the macroeconomic determinants of non-performing loans (NPLs) across 91 countries and find that non-performing

loans are significantly affected by real GDP growth, share prices, exchange rate and lending interest rate. Anastasiou et al (2016) focus on the Euro-area banking system during the 1990 to 2015 period, and find that income tax and output gap significantly influence NPLs.

In the literature, GDP growth rate is considered to negatively correlate with higher NPLs because NPLs tend to be lower during economic boom and are higher during recessionary periods (see, Skarica, 2014; Ozili, 2015; Beck et al, 2015; etc.). Also, higher unemployment is associated with higher non-performing loans because high unemployment levels lower borrowers' capacity to repay loans (Klein, 2013; Nkusu, 2011), while the effect of inflation on non-performing loans is inconclusive in the literature (see, Klein, 2013; Beck et al, 2015, etc.). Global risk-factors may also drive the level of non-performing loans. Espinoza and Prasad (2013) investigate 80 banks from the Gulf Cooperation Council (GCC) region, and employ the VIX proxy to control for global financial volatility and risk aversion. They find that non-performing loans are positively correlated with greater global financial volatility, implying that non-performing loans increases with global risk.

With regard to bank-level determinants, Klein (2013) finds that capital adequacy measured as equity-to-asset ratio is negatively correlated with NPLs, implying that banks with relatively low capital have incentives to engage in risky lending behaviour which increases the incidence of non-performing loans while Boudriga et al (2009) investigate the cross-country determinants of nonperforming loans (NPLs) while controlling for banking supervisory and institutional factors on credit risk exposure. They show that banking sectors with higher capital adequacy ratios and prudent loan loss provisioning report fewer non-performing loans. Additionally, Klein (2013) shows that profitable banks have fewer NPLs because lower NPLs leads to higher interest income which subsequently improves overall profitability.

Moreover, because non-performing is measure of bank performance, the literature that examine the relationship between firm/bank performance and financial development is rather scant. One study, Tanaskovic and Jandric (2015) use private credit to GDP ratio to control for financial sector development while investigating the macroeconomic and institutional determinants of NPLs for some countries in Central, Eastern and South-Eastern Europe (CESEE) during the 2006 to 2013 period. They find that NPL is negatively correlated with GDP and financial sector development, and positively associated with foreign currency loans ratio and exchange rate. Another study Giannetti and Ongena (2009) show that foreign firms are more inclined to fund low-risk borrowers that have promising projects rather than fund unpromising projects belonging to high-risk and well-connected or state-owned firms, and lending to low-risk borrowers with promising projects will reduce the risk of non-performing loans thus improving the asset quality of the firm. However, they did not examine the case of non-performing loans. Following their reasoning, one would expect that countries whose banking sectors are dominated by greater foreign bank assets may experience fewer aggregate non-performing loans. Accordingly, we control for foreign bank presence in our analysis to test this claim.

Foreign bank presence reflects financial development via financial liberalisation and can have some impact on non-performing loans. Demirguc-Kunt and Huizinga (2000) investigate the relationship between financial development and structure on bank performance using bank-level data for developed and developing countries during 1990-1997 period, and show that greater financial sector development is associated with lower profitability for banks reflecting increased efficiency due to increased competition. However, Demirguc-Kunt

and Huizinga (2000) did not examine the case of non-performing loans. In contrast, our study is different because we take a shift from the extant literature to investigate more directly the relationship between non-performing loans and financial (sector) development while controlling for traditional and non-traditional determinants of non-performing loans.

Finally, we did not control separately for macroeconomic factors because we expect causality and/or high correlation between financial development and macroeconomic indicators as indicated by Levine (1997), rather we deflated the financial development indicators by GDP, a macroeconomic indicator. To this end, our analysis in this paper can be viewed as an attempt to examine the relationship between financial development and bank performance, taking non-performing loans as a measure of bank performance.

3. Data and Method

3.1. Data

The data is obtained from the global financial development indicator archived in the World Bank database. We obtain two datasets. First, we obtain country-level data for 134 countries over the 2003 to 2014 period. Second, we obtain data for 6 regions over the same sample period: the six (6) regions are: World, Sub-Saharan Africa (developing countries only), Middle East and North Africa (developing countries only), Latin America and Caribbean (developing countries only), Europe and Central Asia (developing countries only) and East Asian and pacific (developing countries only) regions.

We separate these two datasets to avoid double counting from the first category so that no country is included twice in the analysis. In the first dataset, some countries did not report data for aggregate non-performing loans. Of the 134 countries, 38 countries did not report data for non-performing loans and we exclude these countries from the analysis which reduces the sample to a final sample of 96 banks with available data; however, the final data distribution also include countries with missing NPL values for some years, implying that the data distribution is an unbalanced panel. See Appendix A3 for variable description. The summary of the descriptive statistics show that the full country-sample NPL mean and World NPL mean are approximately the same in Panel A and B. Panel B shows that the level of financial development (PGDP and DGDP) is relatively low in Sub-Saharan Africa compared to other regions.

Panel A: First-Sample Summary of Descriptive statistics

All ratios are expressed in percentages for expositional convenience.

	CI	LD	NII	CAR	NPL	LLC	DGDP	PGDP	CRISIS	BCON	ZSCORE	FOREIGN	LERNER
Mean	54.9	104.8	35.9	15.8	6.3	70.4	62.1	60.1	0.1	69.7	11.4	38.1	0.3
Median	54.9	89.4	34.6	15.1	3.7	60.2	47.8	47.2	0.0	69.3	9.4	27.0	0.3
Maximum	218.1	879.7	80.0	43.4	45.3	322.1	479.7	262.5	1.0	100.0	41.8	100.0	0.9
Minimum	0.0	17.7	0.0	1.8	0.1	0.0	6.10	2.0	0.0	23.4	-12.6	0.0	-1.6
Std. Dev.	14.9	77.3	12.3	4.6	6.6	42.7	57.4	47.6	0.3	18.8	8.0	32.1	0.1
Observations	1128	1108	1127	1005	994	924	1105	1117	864	1062	1131	796	921

Panel B: Second-Sample Summary of Descriptive statistics (Regional)										
	CI	LD	NII	CAR	NPL	LLC	DGDP	PGDP	ZSCORE	LERNER
Regions	mean	mean	mean	mean	mean	mean	mean	mean	mean	mean
SSA	58.44	69.49	43.86	16.19	7.63	52.1	19.145	15.72	7.77	0.29
MENA	47.36	38.70	31.15	13.95	12.3	65.27	53.51	28.93	19.50	0.32
LAC	61.98	87.46	30.05	15.22	3.46	121.43	38.72	31.59	13.61	0.25
ECA	56.58	108.10	36.44	19.68	7.43	61.82	30.10	28.72	6.31	0.27
EAP	48.13	82.05	30.14	15.69	5.81	52.19	38.36	33.10	9.89	0.32
World	55.04	83.89	36.35	15.34	4.00	64.77	40.28	33.93	9.82	0.28

SSA = Sub-Saharan African. MENA = Middle East and North Africa. LAC = Latin America and Caribbean. ECA = Europe and Central Asia. EAP = East Asian and Pacific. All regional data for 2003 to 2014 is available from Global Financial Development indicators at World Bank Database. All ratios are expressed in percentages for expositional convenience.

3.2. Methodology

To investigate the association between non-performing loans and financial development indicators, we estimate the following models.

$$NPL = \beta 0 + \beta 1\, CI + \beta 2\, LD + \beta 3\, NII + \beta 4\, CAR + \beta 5\, LLC + \beta 6\, DGDP + \beta 7\, PGDP + \beta 8\, CRISIS + \beta 9\, BCON + \beta 10\, STABILITY + \beta 11\, FOREIGN + \beta 12\, LERNER + e \qquad Equation\ (1)$$

$$NPL = \beta 0 + \beta 1\, CI + \beta 2\, LD + \beta 3\, NII + \beta 4\, CAR + \beta 5\, LLC + \beta 6\, DGDP + \beta 7\, PGDP + \beta 8\, CRISIS + \beta 9\, BCON + \beta 10\, STABILITY + \beta 11\, FOREIGN + \beta 12\, LERNER + \beta 13\, PGDP * LD + \beta 14\, CI * STABILITY + \beta 15\, DGDP * BCON + e \qquad Equation\ (2)$$

The model in Equation (1) and (2) estimate the relationship between non-performing loans and financial development after controlling for bank-level determinants and the structure of the banking sector, using the first dataset.

For the regional dataset, the data for banking crisis, foreign bank presence, and banking sector concentration variables are not available; therefore, we adjust the model which is re-specified below in Equation as:

$$NPL = \beta 0 + \beta 1\, CI + \beta 2\, LD + \beta 3\, NII + \beta 4\, CAR + \beta 5\, LLC + \beta 6\, DGDP + \beta 7\, PGDP + \beta 8\, STABILITY + \beta 9\, LERNER + \beta 10\, PGDP * LD + \beta 11\, CI * STABILITY + e \qquad Equation\ (3)$$

We control for five determinants that potentially influence the level of non-performing loans at bank-level. The first determinant is cost to income ratio (CI) which reflects bank efficiency. Efficient banks tend to report fewer

non-performing loans compared to inefficient banks (Louzis et al, 2012; Abd Karim et al, 2010); accordingly, we expect that countries with efficient banking sectors should have fewer aggregate non-performing loans.

The second determinant is loan to deposit ratio (LD), measuring bank liquidity (Van den End, 2016). A too high ratio indicates that banks have liquidity problems, and liquidity difficulties of banks are positively correlated with non-performing loans. Accordingly, at country-level we expect that banking sectors with liquidity problems should have fewer non-performing loans; hence, a positive association between aggregate NPL and banking sector liquidity is expected.

The third determinant is non-interest income to total income (NII) ratio (Smith et al, 2003; DeYoung and Rice, 2004). Banks that have significant exposure in non-interest source of income should have fewer non-performing loans because they rely less on interest income derived from bank lending. Similarly, at country-level we expect that banking sectors with higher NII ratio should have fewer non-performing loans. We therefore expect a negative relation between NPL and NII.

The fourth determinant is regulatory capital (CAR). Compared to Boudriga et al (2009) and Klein (2013), we use risk-adjusted capital ratio and expect that banks with higher regulatory capital should have fewer non-performing loans because banks' risk-adjusted capital should limit banks from risky lending that would otherwise lead to higher non-performing loans and reduced profitability (Ozili, 2017). At country-level, we also expect that banking sectors with higher regulatory capital ratios should have fewer non-performing loans, implying a negative relationship between NPL and CAR.

The fifth determinant is the coverage ratio (LLC) measured as loan loss provisions to non-performing loans. A high LLC ratio indicates that bank provisions is sufficient to protect banks from losses arising from rising non-performing loans (Ozili and Outa, 2017); therefore, banks with higher coverage ratios should be able to mitigate problems arising from losses associated with non-performing loans, hence, we expect a negative relationship between NPL and LLC.

Next, we incorporate three financial (sector) development indicators into the model: (i) size of banking sector (DGDP) measured as bank deposit to GDP ratio (Demirguc-Kunt and Huizinga, 2000); (ii) extent of financial intermediation (PGDP) measured as private credit by domestic banks to GDP ratio (Demirguc-Kunt and Huizinga, 2000; Cihak et al, 2012) and (iii) foreign bank presence (FOREIGN) reflecting financial development via financial liberation measured as the ratio of foreign bank assets to total banking assets in the domestic country (Hermes and Lensink, 2004; Giannetti and Ongena, 2009). Foreign bank presence can mitigate connected-lending problems and improve capital allocation by channelling funds to high quality borrowers that are able to repay, thereby reducing the risk of non-performing loans (Giannetti and Ongena, 2009); therefore, we expect a negative relationship between NPL and FOREIGN.

Next, we incorporate four financial structure indicators into the model: banking competitiveness, bank stability, banking concentration and banking crisis indicators. Banking competitiveness is measured by the Lerner index, and banks in highly competitive environments will take deliberate steps to minimise bank risks including non-performing loans in order to gain a favourable risk management perception from investors and regulators, compared to rival banks (Boyd and De Nicolo, 2005; Jimenez et al, 2013). Following this reasoning, countries

with a more competitive banking sector should experience fewer non-performing loans. On the other hand, excessive competition can compel banks to engage in risky lending practices such as reducing their loan screening procedures and using lax lending criteria which in turn would increase the likelihood of generating higher non-performing loans (Manove et al, 2001; Bolt and Tieman, 2004). Given the two competing arguments, we do not have a definite prediction for the association between competition and non-performing loans.

Banking stability is commonly measured by the z-score index in the literature, defined as the ratio of the return on assets plus the capital ratio divided by the standard deviation of the return on assets (Laeven and Levine, 2009; Foos et al, 2009; Demirgüc-Kunt and Huizinga, 2010). Higher Z-score values indicate increased banking stability and we expect that stable banking sectors should have fewer non-performing loans, implying a negative relationship between NPL and the STABILITY variable.

Also, we control for banking concentration but we do not have a definite prediction for this variable. We also control for banking crises, and expect countries to have higher non-performing loans when they experience major financial/economic crises. The correlation matrix in Panel C shows that multicollinearity is not an issue in the analyses. Finally, the model is estimated using the panel OLS regression[3] with country and year fixed effects applied.

[3] We also estimate the model using dynamic panel GMM regression and find results that are not statistically meaningful for the analysis; therefore, we exclude the results from the main analysis and base our inference from the fixed effect OLS regression results. The GMM regression is shown in Appendix A2.

Panel C: Correlation Table:

Probability	CI	LD	NII	CAR	NPL	LLC	DGDP	PGDP	CRISIS	BCON	STABILITY	FOREIGN	LERNER
CI	1.000												
LD	-0.068	1.000											
	0.162												
NII	0.330***	-0.109**	1.000										
	0.000	0.025											
CAR	0.081*	-0.178***	0.119**	1.000									
	0.097	0.000	0.013										
NPL	0.0212	-0.142***	0.072	0.176***	1.000								
	0.662	0.003	0.140	0.000									
LLC	0.057	-0.021	0.029	0.042	-0.175***	1.000							
	0.234	0.666	0.548	0.394	0.000								
DGDP	-0.239***	-0.171***	-0.041	-0.173***	-0.190***	-0.186***	1.000						
	0.000	0.000	0.395	0.000	0.000	0.000							
PGDP	-0.218***	0.374***	-0.077	-0.361***	-0.244***	-0.174***	0.618***	1.000					
	0.000	0.000	0.115	0.000	0.000	0.000	0.000						
CRISIS	0.081*	0.140***	0.038	-0.159***	0.034	-0.187***	0.226***	0.4046***	1.000				
	0.095	0.004	0.432	0.001	0.483	0.000	0.000	0.000					
BCON	-0.042	0.019	0.113**	0.008	-0.031	-0.074	0.061	0.281***	0.109**	1.000			
	0.385	0.690	0.019	0.874	0.518	0.129	0.209	0.000	0.024				
STABILITY	-0.126**	-0.059	-0.107**	0.051	-0.112**	0.054	0.325***	0.149***	-0.088*	0.092*	1.000		
	0.009	0.221	0.026	0.294	0.021	0.266	0.000	0.002	0.068	0.057			
FOREIGN	0.119**	-0.212***	0.007	0.144***	0.073	-0.131***	-0.066	-0.319***	-0.153***	-0.018	-0.212***	1.000	
	0.014	0.000	0.884	0.003	0.130	0.007	0.173	0.000	0.002	0.704	0.000		
LERNER	-0.427***	-0.128***	-0.196***	0.264***	-0.033	0.109**	0.042	-0.091*	-0.313***	0.002	0.179***	0.012	1.000
	0.000	0.008	0.000	0.000	0.502	0.023	0.391	0.061	0.000	0.965	0.000	0.805	

4. Empirical Results

Section 4.1 presents the regression results using the first-sample dataset consisting of 96 countries while Section 4.2 presents the regression results using the regional dataset

4.1. Pooled Country Sample: Results

Column 1 of Table 1 reports the regression result for the association between non-performing loans and financial development. CI coefficient is negatively significant, indicating that NPLs are inversely associated with bank efficiency, implying that countries with efficient banking systems have fewer non-performing loans, and this result supports the finding of Louzis et al (2012). LLC coefficient is also negatively significant indicating an inverse association between NPL and bank loan loss coverage ratio, implying that banks in countries with higher loan loss coverage ratio have fewer non-performing loans because they are better protected against losses arising from problem loans.

PGDP coefficient is positively significant, and indicates a positive association between NPL and financial intermediation, implying that banking sectors with greater financial intermediation activities have more NPLs. CRISIS coefficient is positively significant as expected, and implies that countries that experience major banking crises have high non-performing loans. BCON coefficient is positively significant, and implies that countries with concentrated banking systems have higher non-performing loans. STABILITY coefficient is negatively significant; and implies that aggregate NPLs are lower in countries with stable banking systems. LERNER coefficient is negatively significant, and indicates that countries with competitive banking systems have fewer non-performing loans. FOREIGN coefficient is positively significant and indicates that higher NPLs are associated with banking sectors with greater foreign bank assets, which of course, implies that countries with greater foreign bank presence have higher non-performing loans. CAR coefficient reports a positive sign but is statistically insignificant.

Next, we separately regress NPL against its bank-level determinants only. Column 2 of Table 1 reports the results. All the variables are significant while LLC coefficient remains negatively significant, consistent with the earlier findings in Column 1. Also, we separately regress NPL on each financial development and structure indicator and exclude the bank-level determinants. Column 3 of Table 1 reports the results. PGDP and FOREIGN remain positively significant, confirming the earlier result in Column 1. Also, CRISIS, BCON, STABILITY and LERNER coefficients are all significant except DGDP, confirming the earlier results in Column 1.

4.2. Robustness

4.2.1. Interaction Analysis

From hindsight, we expect some complementarity requiring some interaction analysis.

First, we expect countries with highly-liquid banking sectors to have greater financial intermediation activities and thus should have little or no need for government funding. We therefore check whether non-performing loans are significantly fewer or higher in countries whose banking sectors are liquid and have greater financial intermediation. To do this, we interact NPL variable with the loan to deposit ratio (liquidity indicator) and private credit by bank to GDP ratio (financial intermediation indicator) variables. Column 4 of Table 1 reports the result. LD*PGDP coefficient is insignificant to draw any meaningful inference.

Next, we expect that countries that have efficient banking sectors and greater stability should have fewer non-performing loans. We test for this complementarity by interacting NPL with bank efficiency ratio (CI) and the stability indicator. Column 5 of Table 1 reports the result. CI*STABILITY coefficient is surprisingly positively significant contrary to our expectation, and imply that non-performing loans are positively associated with efficient and stable banking sectors. Further, we test for potential complementarity between banking sector concentration and the size of the banking sector because a large banking sector in several countries may be dominated by few large banks (hence, greater concentration). We test whether this complementarity has any significant impact on non-performing loan. We interact NPL with the banking concentration indicator (BCON) and banking sector size indicator (DGDP) which is bank deposit to GDP ratio. Column 6 of Table 1 reports the result. BCON*DGDP coefficient is statistically insignificant.

4.2.2. Pooled Regional Results

Next, we introduce the second dataset into the analysis. A look at the regional dataset show that data for banking crisis, foreign bank presence, and banking sector concentration variables are not available, hence, the model is re-specified in Equation 3 in Section 3.2. Column 7 of Table 1 reports the regression result. LD coefficient is negatively significant, and indicates that NPLs are inversely associated with bank liquidity, implying that banking sectors with higher liquidity have fewer non-performing. CAR coefficient is also negatively significant indicating an inverse association between NPLs and regulatory capital, implying that banks in countries with higher regulatory capital ratios have fewer non-performing loans. The coefficient of the remaining variables are insignificant while LD*PGDP and CI*STABILITY coefficients are also insignificant in column 8 and 9.

Table 1: Non-performing loans and Financial Development									
	Pooled Country Sample Regression						Pooled Regional Regression		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
c	9.074** (2.55)	-0.807 (-0.42)	-0.473 (-0.17)	8.438** (2.15)	11.543*** (3.22)	6.901* (1.79)	37.127*** (3.61)	38.254*** (3.67)	41.312*** (2.68)
CI	-0.105*** (-4.64)	0.037** (1.94)		-0.104*** (-4.58)	-0.169*** (-5.95)	-0.101*** (-4.42)	-0.171 (-1.58)	-0.174 (-1.60)	-0.249 (-1.04)
LD	-0.010 (-0.88)	0.023** (2.47)		-0.005 (-0.26)	-0.011 (-0.97)	-0.013 (-1.10)	-0.126** (-2.38)	-0.201* (-1.88)	-0.127** (-2.36)
NII	-0.024 (-1.02)	0.045** (2.51)		-0.024 (-1.03)	-0.042* (-1.77)	-0.026 (-1.08)	-0.102 (-0.63)	-0.055 (-0.31)	-0.095 (-0.57)
CAR	0.107 (1.55)	0.214*** (3.57)		0.112 (1.60)	0.152** (2.22)	0.108 (1.57)	-0.786*** (-2.79)	-0.667** (-2.09)	-0.784*** (-2.76)
LLC	-0.022*** (-3.26)	-0.030*** (-5.49)		-0.022*** (-3.19)	-0.022*** (-3.37)	-0.021*** (-3.16)	-0.047 (-1.13)	-0.054 (-1.32)	-0.048 (-1.15)
DGDP	-0.009 (-0.36)		0.006 (0.32)	-0.011 (-0.42)	-0.014 (-0.54)	0.024 (0.69)	0.214 (1.34)	0.243 (1.48)	0.207 (1.28)
PGDP	0.068** (2.17)		0.064*** (2.89)	0.076** (2.02)	0.077** (2.50)	0.077** (2.42)	0.144 (1.01)	-0.078 (-0.25)	0.150 (1.04)
CRISIS	1.569** (2.12)		1.794*** (2.86)	1.651** (2.15)	1.209* (1.65)	1.567** (2.12)			
BCON	0.058** (2.39)		0.059** (2.53)	0.058** (2.37)	0.055** (2.29)	0.102*** (2.62)			
STABILITY	-0.223** (-2.42)		-0.159** (-2.03)	-0.225** (-2.43)	-0.716*** (-4.38)	-0.231** (-2.51)	-0.121 (-0.58)	-0.065 (-0.29)	-0.454 (-0.49)
FOREIGN	0.059** (2.47)		0.038* (1.63)	0.059** (2.42)	0.068*** (2.86)	0.062** (2.56)			
LERNER	-12.351*** (-5.29)		-0.568*** (-4.59)	-12.294*** (-5.25)	-10.726*** (-4.59)	-12.458*** (-5.34)	-4.236 (-0.45)	-3.875 (-0.41)	-5.622 (-0.55)
LD*PGDP				-0.0001 (-0.39)				0.003 (0.80)	
CI*STABILITY					0.009*** (3.63)				0.007 (0.37)
BCON*DGDP						-0.001 (-1.44)			
Country Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	82.40	65.19	80.91	82.41	83.08	82.51	88.71	88.91	88.75
Adjusted R^2	77.37	60.09	76.17	77.32	78.18	77.45	80.97	80.77	80.48
F-statistic	16.39	12.786	17.09	16.18	16.95	16.29	11.457	10.91	10.733
Observations	424	862	464	424	424	424	60	60	60

Column (1)-(6) report regression result for 96 countries for the 2003 to 2014 period and the countries included in the analysis are reported in Appendix A1. Column (7)-(9) report regional regression result for 5 major regions of the world for the 2003 to 2014 period and the regions included in the analysis are reported in Appendix A1 namely Sub-Saharan Africa (developing countries only); Middle East and North Africa (developing countries only); Latin America and Caribbean (developing countries only); Europe and Central Asia (developing countries only); East Asian and pacific (developing countries only). T-statistics are reported in parenthesis. ***, **, * represent 1%, 5% and 10% significance levels. Regression includes country and year fixed effects. Standard errors are not clustered. CI = cost to income ratio, representing bank efficiency. LD = bank loan to bank deposit ratio, representing banking sector liquidity. NII = Non-interest income to total income ratio, representing bank profit from non-loan sources. CAR = ratio of regulatory capital to risk-weight assets, representing regulatory capital. LLC = loan loss coverage measured as loan loss provisions to non-performing loan ratio, represents the ability of bank provisions to protect banks from losses arising from rising non-performing. DGDP = bank deposit to GDP ratio, representing the size of the banking sector. PGDP = private credit by banks to GDP ratio, representing the extent of financial Intermediation. CRISIS = dummy variable that takes the value 1 for countries that had experienced a major banking crisis, and 0 otherwise. BCON = banking concentration. STABILITY = Z-score indicator. FOREIGN = foreign bank assets to total banking asset,

representing foreign bank presence. LERNER = banking competitiveness.

4.2.3. Additional Test

We also estimate the model using dynamic panel GMM regression and find results that are not statistically meaningful for the analysis; therefore, we exclude the results from the main analysis and base our inference from the fixed effect OLS regression results. The GMM regression is shown in Appendix A2

5. Conclusion

The purpose of the study is to investigate the influence of financial development on non-performing loans. In the pooled country analysis, we find that foreign bank presence and financial development (i.e. private credit by banks to GDP ratio) is positive and significantly associated with non-performing loans, implying that non-performing loans increases with greater financial development that take the form of greater foreign bank presence and greater financial intermediation. This could be due to weak supervision of the lending standards of all banks and non-bank financial institutions actively involved in the financial intermediation process. Weak supervision encourage financial institutions to engage in lax lending standards which subsequently gives rise to non-performing loans particularly when abnormal events sets in that affect borrowers' ability to repay.

National bank regulators/supervisor should not only take into account the role that financial development structures play in influencing aggregate non-performing loans but should also ensure that thorough supervision of the lending practices of banks is in place as well as the active monitoring of the financial intermediation process in the country. Among the determinants of non-performing loans, bank efficiency, loan loss coverage ratio, competition and banking system stability are inversely associated with NPLs while NPLs are positively associated with banking crises and bank concentration. For the regional sample, the graphical analysis show that NPLs are negatively related to financial development while the empirical analysis do not show any significant relationship although NPLs are observed to be significantly associated with regulatory capital ratios and bank liquidity, implying that banking sectors with greater regulatory capital and liquidity experience fewer NPLs.

Reference

Anastasiou, D., Louri, H, and Tsionas, M. (2016), "Determinants of non-performing loans: Evidence from Euro-area countries", Finance Research Letters. Vol. 18, pp. 116-119.

Abd Karim, M. Z., Sok, G. C., & Hassan, S. (2010), "Bank efficiency and non-performing loans: Evidence from Malaysia and Singapore", Prague Economic Papers.

Beck, R., Jakubik, P., & Piloiu, A. (2015), 2Key determinants of non-performing loans: new evidence from a global sample", Open Economies Review, Vol. 26 No. 3, pp. 525-550.

Bolt, W., & Tieman, A. F. (2004), "Banking competition, risk and regulation", The Scandinavian Journal of Economics, Vol. 106 No. 4, pp. 783-804.

Boudriga, A., Boulila Taktak, N., & Jellouli, S. (2009), "Banking supervision and nonperforming loans: a cross-country analysis", Journal of Financial Economic Policy, Vol. 1 No. 4, pp. 286-318.

Boyd, J. H., & De Nicolo, G. (2005), "The theory of bank risk taking and competition revisited", The Journal of Finance, Vol. 60, No. 3, pp. 1329-1343.

Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012), "Benchmarking financial development around the world", World Bank Policy Research, Working Paper, 6175, pp. 1-56.

Demirgüç-Kunt, A., & Huizinga, H. (2000), "Financial structure and bank profitability, World Bank Policy Research", Working Paper, 2430.

Demirgüc-Kunt, A. & Huizinga, H. (2010), "Bank Activity and Funding Strategies: The Impact on Risk and Returns", Journal of Financial Economics, Vol. 98, pp. 626-650.

DeYoung, R., & Rice, T. (2004), "Noninterest income and financial performance at US commercial banks", Financial Review, Vol. 39 No. 1, pp. 101-127.

Espinoza, R. A., & Prasad, A. (2010), "Nonperforming loans in the GCC banking system and their macroeconomic effects", IMF Working Papers 10/224, pp. 1-24.

Foos, D., Norden L. & Weber, M. (2010), "Loan Growth and Riskiness of Banks", Journal of Banking and Finance, Vol. 34 No. 12, pp. 2929-2940.

Giannetti, M., & Ongena, S. (2009), "Financial integration and firm performance: Evidence from foreign bank entry in emerging markets", Review of Finance, Vol. 13 No. 2, pp. 181-223.

Hermes, N., & Lensink, R. (2004), "Foreign bank presence, domestic bank performance and financial development", Journal of Emerging Market Finance, Vol. 3 No. 2, pp. 207-229.

Jiménez, G., Lopez, J. A., & Saurina, J. (2013), "How does competition affect bank risk-taking?", Journal of Financial Stability, Vol. 9 No. 2, pp. 185-195.

Klein, N. (2013), "Non-performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance", IMF Working Paper, 01, 27.

Laeven, L. & Levine, R. (2009), "Bank Governance, Regulation and Risk-Taking", Journal of Financial Economics, Vol. 93 No. 2, pp. 259-275.

Levine, R. (1997), "Financial development and economic growth: views and agenda", Journal of Economic Literature, Vol. 35 No. 2, pp. 688-726.

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012), "Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios", Journal of Banking & Finance, Vol. 36 No. 4, pp. 1012-1027.

Manove, M., Padilla, A. J., & Pagano, M. (2001), "Collateral versus project screening: A model of lazy banks", Rand Journal of Economics, pp. 726-744.

Nkusu, M. (2011), "Non-performing Loans and Macro financial Vulnerabilities in Advanced Economies", IMF WP/11/161, pp. 1-27.

Ozili, P. K. (2015), "How Bank Managers Anticipate Non-Performing Loans. Evidence from Europe, US, Asia and Africa", Applied Finance and Accounting, Vol. 1 No. 2, pp. 73-80.

Ozili, P. K. (2017), "Bank Profitability and Capital Regulation: Evidence from Listed and non-Listed Banks in Africa", Journal of African Business, Vol. 18 No. 2. pp. 1-26.

Ozili, P. K., and Outa, E. (2017), Bank Loan Loss Provisions Research: A Review. Borsa Istanbul Review. Available at: https://doi.org/10.1016/j.bir.2017.05.001

Skarica, B. (2014), "Determinants of Non-Performing Loans in Central and Eastern European Countries", Financial Theory and Practice, Vol 38 No.1, pp. 37-59.

Tanasković, S., & Jandrić, M. (2015), "Macroeconomic and institutional determinants of non-performing loans", Journal of Central Banking Theory and Practice, Vol. 4 No. 1, pp. 47-62.

Smith, R., Staikouras, C. & Wood, G., (2003), "Non-interest income and total income stability", Working Paper No. 198, Bank of England.

Van den End, J. W. (2016), "A macroprudential approach to address liquidity risk with the Loan-to-Deposit ratio", The European Journal of Finance, Vol. 22 No. 3, pp. 237-253.

Appendix

Appendix A1: Non-performing loans (Trend)													
S/N	Country	Pre-Financial Crisis					Crisis	Post-Financial Crisis					
S/N	Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	Algeria							21.1	18.3	14.4	11.7	10.6	9.2
2	Argentina	17.7	10.7	5.2	3.4	2.7	3.1	3.5	2.1	1.4	1.7	1.7	2
3	Australia	0.3	0.2	0.6	0.6	0.6	1.3	2	2.1	2	1.8	1.5	1.1
4	Austria	3	2.7	2.6	2.7	2.2	1.9	2.3	2.8	2.7	2.8	2.9	3.5
5	Bahrain						2.3	3.9	5.1	4.9	5.8	5.6	4.6
6	Bangladesh	22.1	17.5							5.8	9.7	8.6	9.4
7	Belarus	3.7	2.8	3.1	2.8	1.9	1.7	4.2	3.5	4.2	5.5	4.4	4.4
8	Belgium	2.6	2.3	2	1.7	1.4	1.7	3.1	2.8	3.3	3.8	4.3	4.4
9	Bolivia	16.7	14	11.3	8.7	5.6	4.3	3.5	2.2	1.7	1.5	1.5	1.5
10	Bosnia and Herzegovina	8.4	6.1	5.3	4	3	3.1	5.9	11.4	11.8	13.5	15.1	14
11	Botswana										2.6	3.6	4.1
12	Brazil	4.1	2.9	3.5	3.5	3	3.1	4.2	3.1	3.5	3.4	2.9	2.9
13	Bulgaria	3.2	2	2.2	2.2	2.1	2.4	6.4	11.9	15	16.6	16.9	16.7
14	Burundi								9.4	7.4	8.2	9.9	10.9
15	Cameroon								10.1	11.4	11.6	10.3	9.7
16	Canada	1.2	0.7	0.5	0.4	0.4	0.8	1.3	1.2	0.8	0.7	0.6	0.5
17	Chile	1.6	1.2	0.9	0.7	0.8	1	2.9	2.7	2.3	2.2	2.1	2.1
18	China	20.4	13.2	8.6	7.1	6.2	2.4	1.6	1.1	1	1	1	1.2
19	Colombia	6.8	3.3	2.7	2.7	3.2	3.9	4	2.9	2.5	2.8	2.8	2.9
20	Congo, Rep.								1	1.1	1.5	1.2	2.5
21	Costa Rica	1.7	2	1.4	1.4	1.2	1.5	2.1	1.9	1.8	1.7	1.7	1.6
22	Croatia	8.9	7.5	6.2	5.2	4.8	4.9	7.7	11.1	12.3	13.8	15.4	16.7
23	Cyprus						3.6	4.5	5.8	10	18.4	38.6	44.9
24	Czech Republic	4.9	4	3.9	3.6	2.4	2.8	4.6	5.4	5.2	5.2	5.2	5.6
25	Denmark	0.8	0.7	0.2		0.6	1.2	3.3	4.1	3.7	6	4.6	4.4
26	Djibouti							9.3	8.3	9.4	11.4	14.5	18
27	East Asia & Pacific (developing only)	13.9	11.9	9.1	7.5	6.35	4.6	3.55	3.4	2.75	2.3	2.3	2.1
28	Egypt, Arab Rep.	24.2	23.6	26.5	18.2	19.3	14.8	13.4	13.6	10.9	9.8	9.3	8.9
29	Europe & Central Asia (developing only)	7.35	6.3	3.8	3.5	3	4.2	7.15	10.2	9.85	9.8	11.6	12.4
30	Finland	0.5	0.4	0.3	0.2	0.3	0.4	0.6	0.6	0.5	0.5		
31	France	4.8	4.2	3.5	3	2.7	2.8	4	3.8	4.3	4.3	4.5	4.2

32	Gabon	13.9	16	14.1	10.7	7.6	8.5	7.2	9.9	4.4	3.4	3.5	
33	Georgia	2.4	2	3.8	0.8	0.8	4.1	6.3	5.9	4.5	3.7	3	3
34	Germany	5.2	4.9	4.1	3.4	2.7	2.9	3.3	3.2	3	2.9	2.7	2.3
35	Ghana	18.3	16.3	13	7.9	6.4	7.7	16.2	17.6	14.1	13.2	12	11.3
36	Greece	7	7	6.3	5.4	4.6	4.7	7	9.1	14.4	23.3	31.9	33.8
37	Grenada						3.46	5.9	7.6	9.4	11.8	13.8	14.6
38	Guatemala	6.5	7.1	2.4	2.3	1.6	2.2	2.7	2.1	1.6	1.3	1.2	1.3
39	Honduras				4	3.1	4.3	4.7	3.7	2.9	3.3	3.4	3.3
40	Hong Kong SAR, China	3.9	2.3	1.4	1.1	0.8	1.2	1.6	0.8	0.7	0.6	0.5	0.5
41	Hungary	2.6	1.8	2.3	2.6	2.3	3	8.2	10	13.7	16	16.8	15.6
42	Iceland	2.1	0.9	1.1	0.8			14.1	18.3	11.6	6.3	4.3	
43	India	8.8	7.2	5.2	3.5	2.7	2.4	2.2	2.4	2.7	3.4	4	4.3
44	Indonesia	6.8	4.5	7.6	6.1	4	3.2	3.3	2.5	2.1	1.8	1.7	2.1
45	Ireland	0.9	0.8	0.7	0.7	0.8	1.9	9.8	13	16.1	25	25.7	20.7
46	Israel	2.6	2.5	2.3	2	1.5	1.5	1.4	3.1	3.4	3.5	2.9	2.2
47	Italy	6.7	6.6	5.3	6.6	5.8	6.3	9.4	10	11.7	13.7	16.5	17.3
48	Japan	5.2	2.9	1.8	1.8	1.5	2.4	2.4	2.5	2.4	2.4	2.3	1.9
49	Jordan	15.5	10.3	6.6	4.3	4.1	4.2	6.7	8.2	8.5	7.7	7	5.6
50	Kenya	34.9	29.3			10.6	8.8	8	6.3	4.4	4.6	5	5.5
51	Korea, Rep.	2.6	1.9	1.2	0.8	0.7	0.6	0.6	0.6	0.5	0.6	0.6	0.6
52	Latin America & Caribbean (developing only)	6.65	4.85	3.1	3.3	2.7	3.1	3.7	3	2.9	2.8	2.8	2.6
53	Lebanon		17.7	16.4	13.5	10.1	7.5	6	4.3	3.8	3.8	4	4
54	Lesotho		1	3	3	3	1.8	3	3	2.1	2.5	3.7	
55	Luxembourg	0.5	0.3	0.2	0.1	0.4	0.6	0.7	0.2	0.4	0.1	0.2	
56	Macedonia	22.4	17	15	11.2	7.5	6.7	8.9	9	9.5	10.1	10.9	10.8
57	Malaysia	13.9	11.7	9.4	8.5	6.5	4.8	3.6	3.4	2.7	2	1.8	1.6
58	Malta		6.5	7.4	5.9	5.9	5.5	5.8	7	7.1	7.8	8.9	9
59	Mauritania								45.3	39.2	25.7	20.4	
60	Mauritius				3	2.5	2	3.3	2.8	2.8	3.6	4.2	4.9
61	Mexico	3.2	2.5	1.5	1.8	2.3	3	2.8	2	2.1	2.4	3.2	3
62	Middle East & North Africa (developing only)	21.45	19.4	16.4	12.2	9	7.5	11.25	10.65	10.15	10.6	9.95	9.05
63	Morocco	18.7	19.4	15.7	10.9	7.9	6	5.5	4.8	4.8	5	5.9	6.9
64	Mozambique	14.4	5.9	3.5	3.1	2.6	1.9	1.8	1.9	2.6	3.2	2.3	3.3
65	Namibia	3.9	2.4	2.3	2.6	2.8	3.1	2.7	2	1.5	1.3	1.3	1.5
66	Netherlands	2	1.5				1.7	3.2	2.8	2.7	3.1	3.2	3.1
67	New Zealand					0.3	0.9	1.7	2.1	1.7	1.4	1	0.9
68	Nigeria	20.5	21.6		9.3	9.5	6.3	37.3	20.1	5.8	3.7	3.4	3
69	Norway	1.6	1	0.7	0.6	0.5	0.7	1.3	1.5	1.7	1.5	1.3	1.1
70	Paraguay	20.6	10.8	6.5	3.3	1.3	1.1	1.6	1.3	1.7	2.1	2	1.8
71	Peru	14.8	9.5	6.3	4.1	2.7	2.2	2.7	3	2.9	3.2	3.5	4

72	Philippines	16.1	14.4	10	7.5	5.8	4.6	3.5	3.4	2.6	2.2	2.4	2
73	Poland	21.2	14.9	11	7.4	5.2	2.8	4.3	4.9	4.7	5.2	5	4.8
74	Portugal	2.4	2	1.5		2.8	3.6	4.8	5.2	7.5	9.8	10.6	11.9
75	Qatar						1.2	1.7	2	1.7	1.7	1.9	1.7
76	Romania	8.3	8.1	1.4	1.8	2.6	2.7	7.9	11.9	14.3	18.2	21.9	13.9
77	Rwanda	33	31	29	25	16.9	12.6	13.1	11.3	8.2	6	7	5.2
78	Senegal	13.3	12.6	11.9	16.8	18.6	17.4	18.7	20.2	16.2	18.4	19.1	20.3
79	Seychelles				4.4	2.3	2	3.8	5.5	8.1	9	9.2	8
80	Sierra Leone	7.4	16.5	26.8	26.9	25.6	17.9	10.6	15.6	15.1	14.7	22.4	33.4
81	Singapore	6.7	5	3.8	2.8	1.5	1.4	2	1.4	1.1	1	0.9	0.8
82	Slovenia	3.7	3	2.5			4.2	5.8	8.2	11.8	15.2	13.3	11.7
83	South Africa	2.4	1.8	1.8	1.1	1.4	3.9	5.9	5.8	4.7	4	3.6	3.2
84	Spain	1	0.8	0.8	0.7	0.9	2.8	4.1	4.7	6	7.5	9.4	8.5
85	Sri Lanka									3.8	3.6	5.6	4.2
86	Sub-Saharan Africa	13.6	12.6	7	7.7	6.95	6.95	7.6	8.6	5.6	4.6	5.1	5.2
87	Swaziland	2	7.2	7	7.7	7.5	7.6	8.6	7.8	7.5	9.7	6.8	6.9
88	Sweden	1.9	1.1	0.8	0.8	0.1	0.5	0.8	0.8	0.7	0.7	0.6	1.2
89	Switzerland	1.3	0.9	0.5	0.3	0.3	0.9	1.1	0.9	0.8	0.8	0.8	0.7
90	Tanzania								7.8	5.4	6.4	5.1	6.6
91	Thailand	13.5	11.9	9.1	8.1	7.9	5.7	5.2	3.9	2.9	2.4	2.3	2.3
92	Tunisia	24.2	23.6	20.9				13.2	13	13.3	14.9	15.2	15.8
93	Turkey	11.5	6.5	5	3.9	3.3	3.4	5	3.5	2.6	2.7	2.6	2.7
94	Uganda	7.2	2.2	2.3	2.9	4.1	2.2	4.2	2.1	2.2	4.2	5.6	4.1
95	Ukraine	28.3	30	5.6	4	3	3.9	13.7	15.3	14.7	16.5	12.9	19
96	United Arab Emirates	14.3	12.5	8.3	6.4	2.6	2.3	4.3	5.6	7.2	8.4	7.3	6.5
97	United Kingdom	2.5	1.9	1	0.9	0.9	1.6	3.5	4	4	3.6	3.1	1.8
98	United States	1.1	0.8	0.7	0.8	1.4	3	5	4.4	3.8	3.3	2.5	1.9
99	Uruguay	14.3	4.7	5.6	3.7	1.1	1	3.8	2.4	1.5	1.3	1.3	
100	Vietnam						2.2	1.8	2.1	2.8	3.4		
101	World	5.75	4.2	3.5	3.1	2.7	3	4.3	4.55	4.1	4.1	4.4	4.35
102	Yemen, Rep.						18	13.9	17.7	21.2	25.5	21.7	24.7
103	Zambia								14.8	10.4	8.1	7	

A2: Non-performing loans and Financial Development						
We also estimate the model using dynamic panel GMM regression and find results that are not statistically meaningful for the analysis; therefore, we exclude the results from the main analysis and base our inference from the fixed effect OLS regression results. The GMM regression is shown in Appendix A2						
Pooled Country-Sample GMM Result						
	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)	Coefficient (t-statistic)
NPLt-1	0.589*** (8.89)	0.582*** (7.635)	0.518*** (-11.51)	0.655*** (8.21)	0.596*** (8.78)	0.614*** (8.90)
CI	-0.062 (-1.17)	0.005 (1.08)		-0.075 (-1.44)	-0.045 (-0.51)	-0.055 (-1.06)
LD	0.045 (0.95)	0.046*** (7.74)		0.144 (1.51)	0.059 (1.08)	0.067 (1.09)
NII	-0.017 (-0.16)	0.059*** (6.21)		-0.059 (-0.55)	-0.005 (-0.05)	-0.063 (-0.54)
CAR	0.064 (0.42)	0.153*** (7.75)		0.096 (0.60)	0.084 (0.37)	0.115 (0.63)
LLC	0.037 (1.56)	-0.038*** (-8.03)		0.020 (0.74)	0.035 (1.47)	0.036 (1.47)
DGDP	-0.096 (-0.72)		-0.247*** (-3.79)	-0.082 (-0.63)	-0.081 (-0.57)	-0.012 (-0.06)
PGDP	0.200 (1.41)		0.319*** (3.93)	0.291* (1.86)	0.178 (1.16)	0.139 (0.81)
CRISIS	-2.085 (-0.76)		-1.601 (-0.84)	-1.173 (-0.40)	-1.608 (-0.58)	-1.853 (-0.65)
BCON	0.225*** (3.38)		0.182*** (4.35)	0.249*** (3.64)	0.219*** (2.98)	0.352* (1.87)
STABILITY	0.032 (0.11)		-0.494*** (-3.33)	0.072 (0.26)	0.130 (0.34)	0.068 (0.23)
FOREIGN	-0.141 (-1.38)		-0.113* (-1.69)	-0.081 (-0.74)	-0.171 (-1.54)	-0.108 (-0.95)
LERNER	-30.77*** (-5.92)		-25.59*** (-7.29)	-31.89*** (-5.92)	-30.91*** (-5.78)	-34.83*** (-4.25)
LD*PGDP				-0.001 (-1.20)		
CI*STABILITY					-0.003 (-0.37)	
BCON*DGDP						-0.002 (-0.73)
Country Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect?	Yes	Yes	Yes	Yes	Yes	Yes
J-statistic	12.71	50.44	20.95	11.34	12.86	12.65
P(J-statistic)	0.625	0.416	0.399	0.658	0.538	0.554
Observations	332	683	364	332	332	332
Column (1)-(6) report regression result for 96 countries for the 2003 to 2014 period and the countries included in the analysis are reported in Appendix A1. T-statistics are reported in parenthesis. ***, **, * represent 1%, 5% and 10%						

significance levels. GMM first-difference regression. Regression includes country first-difference and year fixed effects. Standard errors are not clustered.

A3: Data description and source		
Indicator	Indicator Name	Source
BCON	Bank concentration	Global financial development indicator archived in World Bank database.
CI	Bank cost to income ratio, measuring efficiency.	Global financial development indicator archived in World Bank database.
LD	Bank credit to bank deposits ratio, measuring banking sector liquidity.	Global financial development indicator archived in World Bank database.
DGDP	Bank deposits to GDP ratio, measuring size of banking sector	Global financial development indicator archived in World Bank database.
NPL	Bank nonperforming loans to gross loans ratio	Global financial development indicator archived in World Bank database.
NII	Bank noninterest income to total income ratio, measuring bank profitability from non-loan sources	Global financial development indicator archived in World Bank database.
CAR	Bank regulatory capital to risk-weighted assets ratio, measuring bank capital regulation	Global financial development indicator archived in World Bank database.
CRISIS	Banking crisis dummy (1=banking crisis, 0=none)	Global financial development indicator archived in World Bank database.
FOREIGN	Foreign bank assets among total bank assets ratio, measuring financial liberalisation	Global financial development indicator archived in World Bank database.
LERNER	Lerner index, measuring competition	Global financial development indicator archived in World Bank database.
LLC	Provisions to nonperforming loans ratio, measuring loan loss coverage ratio	Global financial development indicator archived in World Bank database.
PGDP	Private credit by deposit money banks to GDP ratio, measuring extent of financial intermediation	Global financial development indicator archived in World Bank database.
STABILITY	Bank Z-score, measuring banking stability	Global financial development indicator archived in World Bank database.