The determinants of Bank Profitability:
Does Liquidity Creation matter?

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Abstract

Using a panel data set of 4995 banks across 11 developed and emerging countries during the period (2011-2015), this report analyses the amount of liquidity created by banks, how liquidity creation, bank-specific and the macroeconomic factors affecting bank profitability. The results show evidence of increased creation of liquidity over the period. By applying the panel data fixed effect technique, banks that create more liquidity, are set up to have lower profitability. As well as, Asset management, bank size and capital ratio are positively correlated with bank profitability. While, credit quality and operating efficiency affect bank's profits negatively. Additionally, macroeconomic factors have different impact on profitability indicators in each market. Our findings may help decision makers inside and outside bank to determine important factors affecting bank profitability.

Keywords: *Liquidity Creation; Bank Profitability; Emerging Countries; Developed Countries.*

JEL Classification: *G21, G32.*

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1. Introduction

Banks play vital roles in economic developments within different states. The efficient banking systems are leverage force for development. Consequently, commercial banks appear to receive specific attention. Agreeing to *"the modern theory of financial intermediation"*, banks exist to perform two functions: 1) create liquidity; 2) transform risks; and these are the most important roles in the economic system.

Berger and Bouwman (2009) indicate that banks function as liquidity creators when they transform illiquid assets into liquid liabilities or funding illiquid assets with liquid liabilities. Banks create liquidity when holding illiquid items for the non-bankers and offer them with liquid liabilities. For example, when banks engage long-term corporate investments by using saving deposits, they transform illiquid items into liquid ones for the nonbank public.

By contrast, when banks issue long-term subordinated debt to hold marketable securities, they transform liquid items into illiquid ones, which destroy the liquidity. Considerably, when banks use savings deposits to purchase securities, they transform liquid assets into liquid liabilities, and liquidity remains unchanged. Consequently, banks create economic value by doing the transformation of illiquid assets into liquid liabilities.

Additionally, the financial performance needs to be evaluated in order to identify the health of a bank. Therefore, banks use financial ratio analysis (Avkiran, 1994) depending on the set of ratios that help to analyze and compare financial performance between them and evaluate the efficiency of any business. This approach gives a simple interpretation about the bank's performance compared to other periods and helps to improve its management performance (Lin et al., 2005).

The existing literature on banks profitability is rather large. It offers a comprehensive review on the effects of bank-specific, industry-specific, and macroeconomic determinants on bank profitability. Yet, few studies examined the liquidity creation of banks and its relationship with banks profitability. Furthermore, these studies used a panel data of one country for their analysis, and to the best of our knowledge, no study examined the liquidity creation as an internal determinant of bank profitability.

Thus, this paper tests the liquidity creation as an internal determinant of bank profitability in the context of emerging and developed countries. Consequently, this paper investigates the amount of liquidity banks create and the relationship between liquidity creation and bank profitability. Moreover, it

inspects whether the market development level has an effect on the relationship between bank liquidity and bank profitability.

Accordingly, recent data of 4995 commercial banks across five emerging nations and half dozen developed countries from 2011 to 2015 were under investigation. The remainder of the paper is organized as follows. Section 2 the previous literature on liquidity creation and bank profitability are reviewed. Section 3 sets the model and the dependent and independent variables used in the analyses. Section 4 describes the data sample and methodology used. Section 5 presents the results of the empirical analysis, and Section 6 concludes.

2. Literature Review

2.1. Liquidity creation

The literature on the bank liquidity creation remains scarce since its expansion is a late development in the wake of Berger and Bouwman's (2009) article. Their paper makes a major contribution by suggesting a new approach for measuring bank liquidity creation.

The new method is utilized to evaluate the liquidity creation in the banking industry between 1993 and 2003 within the USA. Liquidity creation is found to increase considerably between the years 1993 and 2003. In addition, banks create only about 50% of their liquidity on the balance sheet, which emphasizes the significance of off-balance sheet activities to create liquidity.

Besides, bank liquidity creation and bank value are positively correlated and that the relationship between capital and liquidity creation is positive for large banks, insignificant for medium banks, and negative for small banks. Horvath, Seidler, and Weill (2014) find that capital negatively affects liquidity creation for small banks and liquidity creation causes a decrease in the capital.

Fungacova and Weill (2012) conduct that large banks contribute the most to liquidity creation. Rauch et al (2010) mention that the total amount of liquidity created by the German savings banks increased from 120.7 billion Euros in 1997 to 182.2 billion Euro in 2006. Moreover, Lei and Song (2013) find that liquidity created by Chinese banks increased from 22 billion RMB in 1988 to 2463 billion RMB in 1998 to 11,404 billion RMB in 2008.

2.2. Liquidity creation and bank profitability

In order to manage liquidity, banks try to reduce liquidity creation through holding extra liquid assets to hedge against liquidity risk since that the mismatching of maturities between assets and liabilities. Since liquid assets tend

to generate lower returns, compared to illiquid assets, holding them lowers bank revenues. Accordingly, liquidity creation can positively relate to bank profitability. Amazingly, few works have directly studied the relationship between liquidity creation and bank profitability. Among them, Berger and Bouwman (2009) advise that the more the liquidity is created, the higher the net surpluses are shared among stakeholders and nonbank public. Thus, liquidity creation positively affects the bank value. Moreover, Bordeleau and Graham (2010) indicate that holding more liquid assets reduces the bank's illiquid risk and therefore the chance of default. This, in turn, tends to cut funding costs and generate higher net income. The benefits of lower default risk with more liquid assets may outweigh the costs of lower returns. Moved over the matching arguments, Tran, Lin, and Nguyen (2016) determine that banks, which create more liquidity and exhibit higher liquidity risk, accept lower profitability.

2.3. Determinants of bank profitability

For about four decades, researchers have widely studied the bank profitability and its determinants. Many studies follow Short (1979) and Bourke (1989) trying to identify the factors affecting bank profitability. Some used either a cross-section or panel data of one country for their analysis. For example Molyneux and Thornton (1992), Goddard, Molyneux, and Wilson (2004), Pasiouras and Kosmidou (2007), Flamini et al (2009), Berger, Hanweck, and Humphrey (1987), Athanasoglou et al (2008), Alper and Anbar (2011), and Dietrich and Wanzenried (2011). These studies have different findings with different data sets, time periods, environments, and countries.

However, there are some mutual factors that determinate banks' profitability. Return on average assets, return on equity and net interest margin are commonly used measurements of bank profitability which are expressed as a function of internal and external factors. The internal determinants contain bank-specific variables. The external variables reflect macroeconomics variables. Generally, variables of operating efficiency and the capital ratio function as internal determinants of banking profitability (Bourke, 1989; Javaid et al., 2011; Pasiouras and Kosmidou, 2007). Yet, the external determinants include factors such as the inflation rate, GDP growth and GDP per capita. Athanasoglou et al. (2008) and Demirguc-Kunt and Huizinga (1999) find a positive relationship between inflation, GDP growth, and bank profitability.

Moreover, Dietrich and Wanzenried (2011) find empirical evidence within the Swiss market that the yearly development of deposits has a substantial and negative impact on bank profitability and that this force is seen chiefly in the crisis years. An empirical evidence by Bourke (1989), Demirguc-Kunt and Huizinga

(1999), Abreu and Mendes (2002), Goddard et al. (2004), Ben Naceur and Goaied (2008), Pasiouras and Kosmidou (2007) and Garcia-Herrero et al (2009) indicate that the best performing banks are those who maintain a high level of equity relative to their assets. They shed light on the relation with the observations that banks with higher capital ratios are more potential to face lower costs of financing due to lower prospective bankruptcy costs.

Moreover, there is empirical evidence that the level of operational efficiency, which is measured by the cost-income ratio or overhead costs over total assets, positively affects bank profitability (Athanasoglou et al., 2008; Goddard et al., 2009).

3. Variable Selection

3.1. Dependent variables

Return on average assets (ROAA), return on average equity (ROAE) and the net interest margin (NIM) are the chief accounting measures of bank profitability. The ROAA is ratio of after tax profit over average total assets (expressed in %), while ROAE is return of after tax profit over average total equity. However, NIM is net interest income divided by total assets. The ROAA indicates the ability of a bank's management to generate profits from the bank's assets. It shows the profits earned per dollar of assets as well as how effectively the bank's assets were managed to generate revenues.

In order to capture changes in assets through the fiscal year, this study relies on the average asset value. Golin and Delhaise (2013) show that the ROAA has arisen to be the key ratio in evaluating the bank profitability and seems to be the most common measure of bank profitability in the literature.

Additionally, since the analysis of the ROAE neglects financial leverage and the risk associated with it, ROAA is considered as the key ratio for evaluating the bank profitability in addition the results are deliberated as supplementary evidence only. Banks with lower equity to assets ratios will usually report lower ROAE. Finally, NIM serves as the third performance measure.

Therefore, the ROAA and ROAE show how fit bank's management uses the bank's actual investment resources and the NIM reflects the profit earned on interest activities.

3.2. Independent variables

3.2.1. Bank-specific profitability determinants

In order to reflect the internal determinants of bank profitability, this paper uses liquidity creation over total assets ratio, asset management, the capital ratio, the cost-to-income ratio, loan-loss provisions over total loans, the deposits over total assets ratio, and funding costs.

Berger and Bouwman (2009) propose a classification of all balance-sheet items as either liquid, semi-liquid, or illiquid. This classification was applied to all items in a bank's assets, liabilities, equity, and off-balance-sheet activities. Later, they use four different measures of liquidity creation for every item. Two measures are based on a category classification of the balance-sheet items, while the other two are based on maturity. For each type, one measure includes off-balance sheet activities, while the other does not. And so, they give weights to every single item and calculate the measure of liquidity created by each bank. This paper only uses *"cat fat"* measure of liquidity creation which classifies loans based on category and includes off balance sheet activities because it is the preferred measure among other measures (Berger and Bouwman, 2009). Table 1 Panel A illustrates how bank activities are classified and weighted. Panel B illustrates the calculation of *"cat fat"*.

Granting to the literature, few papers have directly focus on studying the relationship between liquidity creation and bank profitability. For example, Berger and Bouwman (2009) suggest the positive correlation between the liquidity creation and bank value. Given the opposing arguments, Tran, Lin, and Nguyen (2016) have found that banks, which create more liquidity and exhibit higher illiquidity risk, have lower profitability.

Additionally, others like Athanasoglou et al (2008) and Iannotta, Nocera, and Sironi (2007) have used the ratio of equity to assets (capital ratio) as a measure of capital strength. Generally they find that banks with higher capital ratios are considered safer. The conventional risk-return hypothesis would thus indicate a negative relationship between the equity to assets ratio and bank profitability. However, a lower risk should increase a bank's creditworthiness and reduce its funding cost. Moreover, banks with higher equity to assets ratio generally have a reduced need for an external funding, which in turn sustains a positive influence on their profitability. Thus, the overall effect is theoretically undetermined.

Table 1. Liquidity classification of bank activities and construction of liquidity creation measure

Panel A: Liquidity Classification of Bank Activities		
ASSETS		
Illiquid assets (weight=1/2)	*Semiliquid assets (weight=0)*	*Liquid assets (weight=−1/2)*
Corporate & commercial loans	Residential mortgage loans	Cash and due from banks
Investments in property	Other mortgage loans	Trading securities and at fv through income
Foreclosed real estate	Other consumer/retail loans	Tradable derivatives
Fixed assets	Loans and advances to banks	Available-for-sale securities
Goodwill	Reverse repos and cash collateral	Held to maturity securities
Other intangibles		At-equity investments in associates
Other assets		Other securities
LIABILITIES PLUS EQUITY		
Liquid liabilities (weight=1/2)	*Semiliquid liabilities (weight=0)*	*Illiquid liabilities+equity (weight −1/2)*
Customer deposits — current	Customer deposits — term	Senior debt maturing after 1 year
Customer deposits — savings	Deposits from banks	Subordinated borrowing
Tradable derivatives	Repos and cash collateral	Other funding
Trading liabilities	Other deposits and short-term borrowings	Credit impairment reserves
	Fair value portion of debt	Reserves for pensions and other
		Current tax liabilities
		Deferred tax liabilities
		Other deferred liabilities
		Other liabilities
		Total equity
OFF-BALANCE-SHEET ACTIVITIES		
Illiquid activities (weight=1/2)	*Semiliquid activities (weight=0)*	*Liquid activities (weight=−1/2)*
Acceptances & documentary creditsreportedoff-balance-sheet	Managed securitized assets reported off-balance-sheet Other off-balance-sheet exposure to securitizations	
Committed credit lines		
Other contingent liabilities Guarantees		

Panel B: CAT.FAT Formula

Cat fat = 1/2 * illiquid assets +0 * semiliquid assets −1/2 * liquid assets
+1/2 * liquid liabilities +0 * semiliquid liabilities −1/2 * illiquid liabilities −1/2 * equity
+1/2 * illiquid activities +0 * semiliquid activities −1/2 * liquid activities

Source: Adopted from Lei and Song (2013)

Bank size, logarithm of total assets, is seen as a significant causal factor of profitability (e.g., Athanasoglou et al., 2008; Demirguc-Kunt and Huizinga, 1999). Larger banks are expected to have economies of scale (increased operational efficiency) and economies of scope (higher degree of product and loan diversification) advantages than smaller ones. Thus, we expect a positive impact of size on bank profitability (Pasiouras and Kosmidou, 2007).

Though, Berger et al (1987) and Pasiouras and Kosmidou (2007) have discovered that extremely large banks show a negative relationship between size and profitability because of bureaucratic and some other reasons linked to size. Thus, the overall influence needs to be studied empirically.

The cost to income ratio is defined as the operating costs over total generated revenues (Pasiouras and Kosmidou, 2007) and it is expected to have a negative relationship with bank profitability. In order to proxy credit risk, the loan-loss provisions to total loans ratio is applied. Theory suggests that an increased exposure to credit risk is associated with decreased bank profitability. Thus, a negative effect of credit risk on bank profitability is expected. Moreover, banks need to pay interest on their deposits. These funding costs (interest expenses over average total deposits) vary across banks and over time. Generally, banks that have the ability to raise funds more cheaply are expected to be more profitable.

Table 2. Definition of variables

CODE	FORMULA	DESCRIPTION	EXPECTED EFFECT
DEPENDENT VARIABLES			
ROAA	Net income/Total Assets (%)	Return on Asset	
ROAE	Net income/Total Equity (%)	Return on Equity	
NIM	Net Interest Income/Total Assets (%)	Net Interest Margin	
INDEPENDENT VARIABLES			
Bank-specific factors (internal factors)			
LC	Liquidity creation/Total Assets (%)	Normalized Liquidity Creation	+/-
AM	Operating Income/Total Assets (%)	Asset Management	+
SIZE	Log (Total Assets)	Logarithm of Total Assets	+
DEPOST	Total Deposits/Total Assets (%)	Deposits	+/-
CA	Total Equity/Total Assets (%)	Capital Adequacy	+/-
LOAN	Loan loss provisions/Total Loans (%)	Credit Quality	-
CIR	Total Costs/Total Income (%)	Operating Efficiency	-
FC	Interest paid/Total deposits (%)	Funding Cost	-
Macroeconomic factors (external factors)			
GDPGROWTH	Annual growth of GDP (%)	Yearly GDP growth	+
INFLATION	Annual Inflation rate (%)	Yearly Inflation rate	+/-

3.2.2. Macroeconomic determinants

Considerable evidences show that the country-level macroeconomic along with the financial structure variables have a significant effect on bank profitability. A positive impact on a bank's profitability is expected to occur, according to the literature in the field studying the relationship between economic growth and financial sector profitability (e.g., Albertazzi and Gambacorta, 2009; Athanasoglou et al., 2008; Bikker and Hu, 2002; Demirguc-Kunt and Huizinga, 1999).

The effect of inflation on bank profitability relies to wages and other operating expenses grow at a faster rate than the inflation or not. Studies like Bourke (1989) and Molyneux and Thornton (1992) have found a positive relationship between inflation and profitability. All the same, if inflation is not anticipated and banks do not adjust their interest rates correctly, the costs may increase faster than revenues and henceforth affect bank profitability adversely. Thus, the overall effect is theoretically undetermined. For a summary of the definitions of dependent and explanatory variables, see Table 2.

4. Data and Methodology

4.1. Data

The main data source for the bank-specific characteristics is the Fitch-IBCA Bank focus database that affords annual financial data for banks around the world. The macroeconomic factors, namely inflation and GDP growth are delivered from the World Bank and International Monetary Fund (IMF) databases. The data of the Bank focus database are carefully edited in the following ways in order to use it for our statistical analysis. Because the focus of this paper is on commercial banks, central banks are excluded. In a further step, duplicate information is eliminated.

The sample is an unbalanced panel dataset of 4995 commercial banks operating in 6 developed countries (G7 countries excluding the USA) and 5 emerging countries (BRICS countries), consisting of 15468 observations over the years 2011–2015. As outlined in table3, there are 1786 banks from 5 Emerging countries and 3209 banks from 6 developed countries. The sample is chosen because this study focuses on emerging and developed market as well as it includes some of the most developed countries in the world and the most emerging countries as well.

Table 3. Banks in sample by Market

	All	Emerging	Developed
Number of Observations	15,468	4,351	11,117
Number of Banks	4,995	1,786	3,209

Table4 shows the descriptive statistics for the variables used in the analyses. The mean and the standard deviation are shown (in parenthesis) for the full sample and for market categories.

In addition, the significant differences between the variables of different market categories are checked. One column was added to report the significance level of the difference between the two categories for each variable. These results are based on t-test (mean comparison test) to briefly highlight a few interesting observations. As expected, there exists a large heterogeneity across the market categories. Concerning the profitability variables, return on assets and net interest margin, we observe a decrease in profitability with an increase in market level. The differences are statistically significant at the 1% level. However, the difference in return on equity is insignificant between two market categories.

It is observed that the liquidity creation to total assets ratio for developed countries is lower than in emerging countries. However, the bank is, on average, bigger for developed countries than in emerging economies. The capitalization of banks also differs considerably between market categories. In fact, banks in the emerging countries are better capitalized than those in the developed countries where equity over total assets amounts to about 22% on average. This is also clear from deposits to total assets ratio, which shows that deposit ratio of developed countries is higher than deposit ratio of emerging countries. Banks in emerging countries have, on average, lower cost-to-income ratio than developed countries. It seems that banks acting in emerging countries do not only have cost advantages (e.g. lower wages) but also higher income possibilities, as interest margins are higher in these countries. The loan loss provisions variable shows that the quality of the credit portfolio as well as the allocation efficiency in the credit market is much lower for banks in developed countries than in emerging countries. Inflation rates are higher in emerging countries, on average. This is at least partly related to an often-inflationary monetary policy in emerging countries and a less stable macroeconomic environment in general. Furthermore, we observe that the GDP growth is, on average, higher for developed countries than for emerging economies.

Table 4. Descriptive Statistics by Market

Variable	Description	ALL	Emerging (E)	Developed (D)	Diff (E-D)
ROAA	Return on Asset	0.6318 (2.2782)	1.1195 (3.2657)	0.441 (1.7084)	0.6785***
ROAE	Return on Equity	5.6205 (27.3754)	5.5803 (20.0254)	5.6363 (29.7627)	-0.0559
NIM	Net Interest Margin	3.9259 (4.1791)	6.5105 (6.1415)	2.9143 (2.4296)	3.5962***
LC	Normalized Liquidity Creation	23.0893 (28.6737)	31.6553 (33.3131)	19.7367 (25.8797)	11.9185***
AM	Asset Management	4.4888 (5.7886)	7.8653 (5.8660)	3.1673 (5.1913)	4.698***
SIZE	Logarithm of Total Assets	5.9525 (1.1504)	5.2571 (1.4706)	6.2246 (0.8555)	-0.9675***
DEPOST	Deposits	65.1423 (23.7223)	55.0564 (23.5547)	69.0897 (22.5942)	-14.0334***
CA	Capital Adequacy	12.7165 (12.8101)	21.9836 (18.5616)	9.0894 (6.8362)	12.8942***
LOAN	Credit Quality	4.2330 (7.2997)	7.2165 (9.1302)	3.0653 (6.0558)	4.1511***
CIR	Operating Efficiency	72.3442 (33.3647)	65.5002 (35.7462)	75.0229 (31.9904)	-9.5227***
FC	Funding Cost	7.8169 (45.8986)	14.0642 (56.9897)	5.3719 (40.4852)	8.6923***
GDPGROWTH	Yearly GDP growth	0.7121 (2.2374)	0.3482 (3.7415)	0.8545 (1.1897)	-0.5063***
INFLATION	Yearly Inflation rate	2.8793 (3.5755)	7.7021 (3.2704)	0.9917 (0.9670)	6.7104***

Notes: The standard deviations are given in paranthesis.

4.2. Econometric Model

The effects of internal and external factors on bank profitability were empirically investigated by using regression analyses and use a fixed effect model given by the following:

$$Profitability_{it} = C + \beta_1 LC_{it} + \beta_2 AM_{it} + \beta_3 SIZE_{it} + \beta_4 DEPOST_{it} + \beta_5 CA_{it} + \beta_6 LOAN_{it} + \beta_7 CIR_{it} + \beta_8 FC_{it} + \beta_9 GDPGROWTH_{it} + \beta_{10} INFLATION_{it} + e_{it}$$

$Profitability_{i,t}$ is the profitability of bank i at time t measured by (ROAA, ROAE or NIM), with $i = 1, . . ., N, t = 1,. . ., T; C$ is a constant term; *LC* is the liquidity creation over total assets; *AM* is the operating income over total assets; *SIZE* is the natural logarithm of total assets; *DEPOST* is total deposits over total assets; *CA* is the capital adequacy ratio measured by total equity over total assets; *LOAN* is the

credit quality ratio measured by loan loss provision over total loans; *CIR* is the operating efficiency ratio measured by total cost over total income; *FC* is the interest paid over total deposits; *GDPGROWTH* is the annual GDP growth; *INFLATION* is annual inflation rate; and e_{it} it is the disturbance.

To decide between fixed or random effects, we run a Hausman test that hypothesizes the null hypothesis of H_0: Both fixed and random effects models are consistent, however random effects model is more efficient, against alternative H_1: Fixed effects model is consistent, random effects model is not consistent. We reject the null hypothesis at 1% significance level with p-value of 0.000, which indicate that the fixed effect model is appropriate for our data.

5. Findings and Discussion

5.1. Analysis of Liquidity Creation

Different analyses have been done such as measuring the size of liquidity banks create and exploring how liquidity creation has changed over time. Then the banks are initially split by market category. Table 5 shows the summary of statistics on bank liquidity creation based on cat.fat measure for the entire banking sector and separately for emerging and developed countries. It also shows graphs of liquidity creation for each group using the cat.fat measure. It is found that banks created liquidity of $38.74 billion from 2011 to 2015 which equals 29% of industry total assets.

Table 5. Summary Statistics of Bank Liquidity Creation

| Liquidity Creation	LC ($bln)	LC/TA (%)	N
2011 ALL	9,238	17.1956	1,242
2011 Emerging	5,321	33.3420	127
2011 Developed	3,917	15.3566	1,115
2012 ALL	12,237	14.6144	1,299
2012 Emerging	5,896	31.8769	139
2012 Developed	6,341	12.5459	1,160
2013 ALL	16,588	22.2431	3,578
2013 Emerging	7,841	26.8069	726
2013 Developed	8,747	21.0813	2,852
2014 ALL	18,695	25.5009	4,744
2014 Emerging	8,357	33.0275	1,712
2014 Developed	10,338	21.2510	3,032
2015 ALL	17,528	25.2427	4,605
2015 Emerging	7,815	32.2174	1,647
2015 Developed	9,713	21.3592	2,958
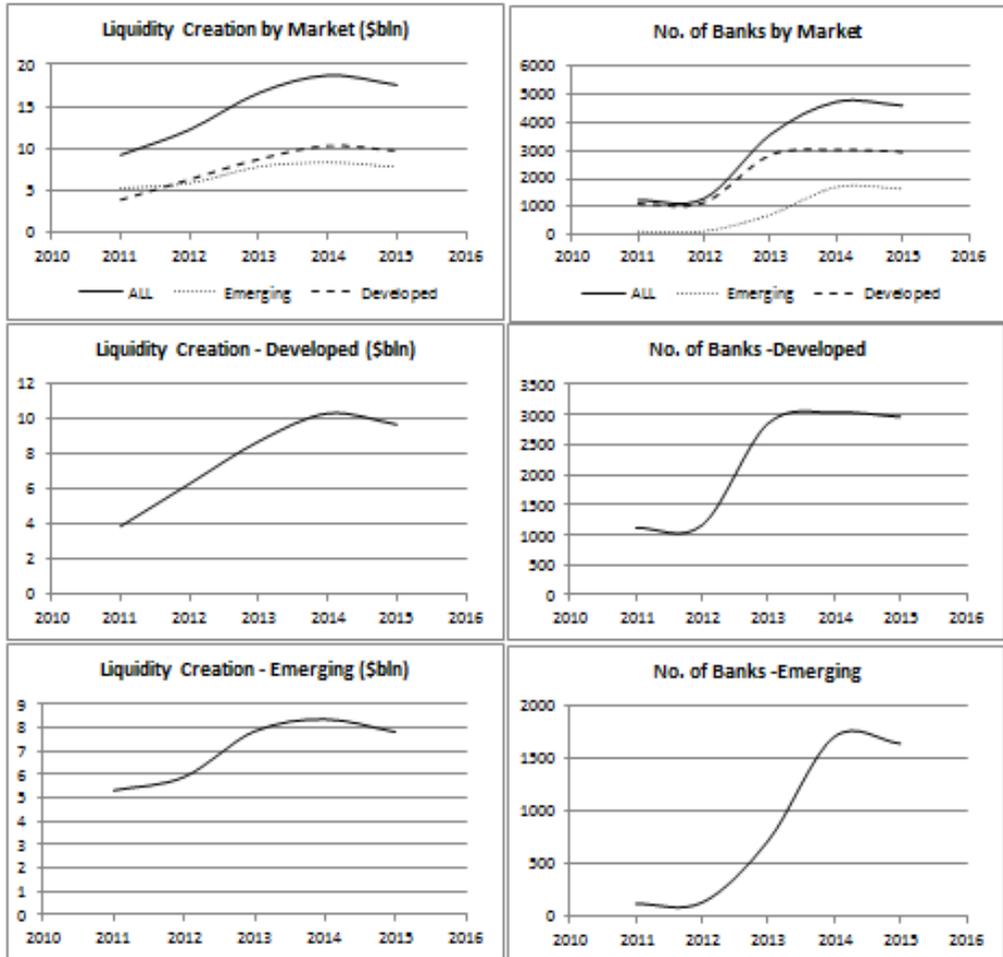
Figure1. Summary Statistics of Bank Liquidity Creation

Consequently, as appears in the cat.fat table, based on this measure, liquidity creation increased in years from 2011 to 2014 but dropped in 2015; it increased from $9238 billion in 2011 to $18695 billion in 2014 then dropped to $17528 billion in 2015. The reason for this drop is that the increases in creating activities of liquidity are lower than those increases in destroying activities of liquidity. Besides, the number of banks in 2014 (4774) is bigger than the one in 2015 (4605) and it could lower the amount of liquidity created by banks in 2015. Thus, the total amount of liquidity created by banks decreased from $18695 billion in 2014 to $17528 billion in 2015.

In the developed countries, it is found that banks created liquidity of $39056 billion from 2011 to 2015 based on preferred *"cat fat"* measure, which equals 29% of industry TA. Similarly, liquidity creation increased in every year from 2011 to 2014 and dropped in 2015; it increased from $3917 billion in 2011 to $10337 billion in 2014 then dropped to $9712 billion in 2015.

In emerging countries, it is found that banks created liquidity of $35233 billion from 2011 to 2015, which equals 31% of industry TA. And the liquidity creation based on this measure increased in every year from 2011 to 2014 but dropped in 2015; it increased from $5.321 billion in 2011 to $8357 billion in 2014 then dropped to $7815 billion in 2015.

5.2. Univariate Results

Table 6 clarifies the mean of ROAA by market category for various subsamples (above and below the median value of each of explanatory variables) in addition to the corresponding means of difference tests. The results from these univariate tests designate that the variables that are included in the model have strong explanatory power.

Moreover, the factors of the cost-income ratio, the loan loss provisions and the capital ratio affect bank profitability across both market categories in a similar way; we observe significant differences between the basic data relationships depending on the level of a market economic development.

Although larger banks, for instance, seem to be more profitable in emerging countries, smaller ones tend to be more profitable in developed countries. Consequently, banks, which have low liquidity creation to total asset ratio, appear to be more profitable in developed countries, but such relationship seems not to be occurred in emerging countries.

Furthermore, banks with high asset management quality tend to be more profitable in emerging countries but this relationship is insignificant in developed countries. These preliminary results from analyzing basic data relationships are confirmed by the regression analyses described in what follows. Similar univariate tests are carried out for ROAE and NIM. The corresponding results are shown in Appendix (Table 10 and Table 11).

Table 6. Univariate tests: mean of ROAA in different subsamples by market category

	ALL			Emerging			Developed		
	Low (0)	High (1)	Diff	Low (0)	High (1)	Diff	Low (0)	High (1)	Diff
LC	0.6883	0.5762	0.1121***	1.1447	1.0962	0.0485	0.5315	0.3513	0.1802***
AM	0.3865	0.8791	-0.4926***	0.7366	1.5044	-0.7678***	0.4276	0.4561	-0.0285
SIZE	0.7075	0.5572	0.1503***	1.3524	0.8888	0.4636***	0.3696	0.5144	-0.1448***
DEPOST	0.7574	0.5083	0.2491***	1.3379	0.9034	0.4345***	0.4042	0.4793	-0.0751***
CA	0.3658	0.9000	-0.5342***	0.5594	1.6815	-1.1221***	0.3775	0.5066	-0.1291***
LOAN	0.6576	0.6084	0.0492	1.5314	0.7083	0.8231***	0.5569	0.3262	0.2307***
CIR	1.1333	0.1321	1.0012***	1.9497	0.2902	1.6595***	0.7004	0.1835	0.5169***
FC	0.5158	0.7501	-0.2343***	1.5573	0.6833	0.874***	0.5624	0.3201	0.2423***
GDP GROWTH	0.6224	0.6443	-0.0219	1.2388	0.9692	0.2696***	0.3796	0.5155	-0.1359***
INFLATION	0.4446	0.8233	-0.3787***	1.3182	0.8973	0.4209***	0.4472	0.4322	0.0150

Notes: The table reports the mean of the ROAA variable for different subsamples by market category. The subsample Low (High) contains all observations which are below (above) the median of the corresponding variable in the first column. For the notation of the variables see Table 2. The period covers the years 2011–2015. The *, **, and *** denotes statistical significance of the difference at the 0.10, 0.05, and 0.01 level.

5.3. Empirical results for ROAA

Table7 shows the regression results for the main profitability measure ROAA. The estimations for emerging and developed countries are provided separately. Column one shows the results when the banks from all countries are simultaneously considered, while columns two and three show the estimation results by categories mentioned earlier. Overall, it is observed that some significant and interesting differences between the estimation results for the groups, both with respect to the significance and the size of the coefficients. Given this heterogeneity, it seems important and required to consider the categories separately.

The results for the determinants of the main profitability measure ROAA show that liquidity creation divided by TA are significantly negatively correlated with the bank profitability measured by ROAA in emerging countries, with correlation coefficient -0.035. The results are consistent with the expected bankruptcy cost hypothesis. The hypothesis argues that liquidity creation is negatively correlated to bank profitability. A higher level of illiquidity risk due to liquidity creation increases the chance of bankruptcy, henceforth lowering bank profitability (Tran, Lin, and Nguyen, 2016). On the other hand, liquidity creation has no effect on ROAA in developed countries.

The coefficients of the asset management quality measure, operating income to total assets, are significantly positive in the emerging market, which conform to our expectation: the more quality of asset management, the higher is the profitability. This result is consistent with Athanasoglou et al (2008) and Dietrich and Wanzenried (2011) who clearly show that an efficient asset management is a prerequisite for improving the profitability of banks around the world.

The coefficients of bank size, logarithm total assets, are significantly positive in the emerging and developed markets, which conform to the expectation that the bigger the bank size, the higher its profitability. Larger banks, consequently, were able to profit from higher product and loan diversification possibilities as well as the economies of scales.

The capital ratio, which is defined as the equity over the total assets, has a significant positive effect on the bank profitability in all specifications. Better-capitalized banks are safer compared to those with lower capital ratios and they may face lower costs of funding due to lower prospective bankruptcy costs. In solid terms, an increase of the capital ratio by 1% leads to an increase in the mean of the ROAA is 0.10% and 0.07% in emerging and developed countries respectively. This result approves the empirical evidence of Bourke (1989), Demirguc-Kunt and Huizinga (1999), and Berger and Bouwman (2013).

The coefficients of the efficiency measure, the cost-to-income ratio, are significantly negative in all specifications, which conform to our expectation: the more efficient the bank, the higher is its profitability. This result is consistent with literature such as Athanasoglou et al (2008) and Dietrich and Wanzenried (2011) which clearly shows that an efficient cost management is a prerequisite to develop the profitability of banks around the world. Interestingly, we observe that the effect is larger in emerging countries compared to developed countries. The loan loss provisions relative to total loans is a measure for credit quality and credit allocation.

As we can see from our estimation results, this variable has a statistically significant negative and rather strong effect on the bank profitability in all specifications. The control of credit quality remains a particularly important in the aspect of the current economic slowdown. This can also be seen by looking at concrete figures. In case a bank in emerging countries manages to lower its credit risk by 1%, the average expected positive effect on the mean of ROAA is 0.156% and 0.081% in emerging and developed countries respectively.

The deposit ratio, measured by over total assets, and funding costs have no significant effect on bank profitability in all specifications. Considering the

external factors related to the macroeconomic environment and the financial structure of the countries in which the banks are operating, Inflation rate has a positive and significant effect on profitability in developed countries.

Table 7. Regression Result ROAA

ROAA	ALL	Emerging	Developed
LC	-0.0026** (0.0012)	-0.035** (-2.06)	-0.0008 (0.0007)
AM	0.2649*** (0.0863)	0.2878*** (0.1042)	0.1456 (0.0967)
SIZE	2.7912*** (0.7077)	2.4156** (1.0265)	2.5815*** (0.8910)
DEPOST	-0.0001 (0.0077)	0.0065 (0.0143)	0.0005 (0.0054)
CA	0.1075*** (0.0322)	0.1018*** (0.0394)	0.0759*** (0.0291)
LOAN	-0.1312*** (0.0294)	-0.1561*** (0.0416)	-0.0812** (0.0335)
CIR	-0.0184*** (0.0044)	-0.0331*** (0.0092)	-0.0123*** (0.0041)
FC	0.0016*** (0.0012)	0.0024 (0.0019)	-0.0001 (0.0008)
GDPGROWTH	0.0922 (0.0167)	-0.0321 (0.0303)	0.1586*** (0.0332)
INFLATION	0.0682*** (0.0259)	-0.0198 (0.0371)	0.1187*** (0.0201)
C	-16.8584*** (4.5376)	-11.9149** (6.2189)	-15.8809*** (5.4405)
No of Obs	15,468	4,351	11,117
No of Banks	4,995	1,786	3,209
F-Test	13.26***	11.43***	7.27***

Notes: The table reports results from panel data fixed effect model of the effects of bank- specific characteristics and macroeconomic factors on bank profitability. The dependent variable is the return on average assets ROAA. Standard errors are reported in paranthesis. For the notation of the variables see Table 2. The period covers the years from 2011 to 2015.The *, **, and *** denotes statistical significance of the difference at the 0.10, 0.05, and 0.01 level.

This means that inflation is anticipated and banks adjust their interest rates correctly; and revenues may increase faster than costs and henceforth affect bank profitability positively. The effect of GDP growth on bank profitability is statistically significant positive in developed countries, which means that bank profits in these countries usually increase in prosperous economic times.

5.4. Empirical results for ROAE

Table8 shows the regression results for the second profitability measure ROAE. The first column of shows the results when the banks from all countries are simultaneously considered, while columns two and three show the estimation results by categories mentioned earlier. The results for ROAE variable largely confirm the findings from the ROAA estimations. Therefore, the focus is on highlighting some relevant differences between the two regression results.

Table 8. Regression Result ROAE

ROAE	ALL	Emerging	Developed
LC	-0.0301** (0.0154)	-0.0703 (0.0624)	-0.0302* (0.0162)
AM	0.7931** (0.3184)	0.4522 (0.3633)	1.5272** (0.6773)
SIZE	12.4181** (5.9314)	11.4633* (6.6732)	21.2481* (12.834)
DEPOST	0.1092 (0.0701)	0.2513* (0.1482)	0.0911 (0.0725)
CA	0.8925*** (0.2032)	0.9112*** (0.2381)	1.0824*** (0.4211)
LOAN	-1.1984*** (0.2662)	-0.7622*** (0.2083)	-1.7103*** (0.6283)
CIR	-0.1291*** (0.0275)	-0.1773*** (0.0512)	-0.1071*** (0.0314)
FC	-0.0032 (0.0134)	0.0091 (0.0144)	-0.0103 (0.0172)
GDPGROWTH	1.1443*** (0.3194)	-0.3212* (0.1953)	2.1295*** (0.6866)
INFLATION	0.8184** (0.3483)	-0.6283** (0.3003)	1.5763*** (0.5963)
C	-78.4055** (38.6004)	-67.9321* (38.4741)	-137.0401 (85.1733)
No of Observations	15,468	4,351	11,117
No of Banks	4,995	1,786	3,209
F-Test statistics	8.51***	13.26***	3.09***

Notes: The table reports results from panel data fixed effect model of the effects of bank- specific characteristics and macroeconomic factors on bank profitability. The dependent variable is the return on average assets ROAE. Standard errors are reported in paranthesis. For the notation of the variables see Table 2. The period covers the years from 2011 to 2015. The *, **, and *** denotes statistical significance of the difference at the 0.10, 0.05, and 0.01 level.

In contrast with the results of ROAA measure, liquidity creation doesn't have any effect on ROAE in emerging countries, but it has a significant negative effect on ROAE in developed countries. In addition, the asset management doesn't have

any effect on ROAE in emerging countries, but it has a significant positive effect on ROAE in developed countries. Finally, estimates of GDP growth and inflation show a positive significant effect on ROAE in developed, while they are negative in emerging market. This means that inflation in emerging market was not anticipated, so the banks have adjusted their interest rates mistakenly as a result the costs maybe increased faster than revenues and hence might affect bank profitability adversely.

5.5. Empirical results for NIM

The results for the net interest margin (NIM) variable confirm some findings, but have many differences from our other bankprofitability estimations (see

Table 9. Regression Result NIM

ROAA	ALL	Emerging	Developed
LC	0.0011	0.0103	0.0011
	(0.0012)	(0.0094)	(0.0012)
AM	0.2391***	0.3113***	-0.0333
	(0.0654)	(0.0773)	(0.0933)
SIZE	0.2283	-0.8641	0.0882
	(0.4723)	(0.8423)	(0.3402)
DEPOST	0.0033	0.0031	0.0052
	(0.0061)	(0.0122)	(0.0041)
CA	0.0711***	0.0755***	0.0414***
	(0.0161)	(0.0221)	(0.0142)
LOAN	-0.0122	0.0313	-0.0833***
	(0.0263)	(0.0212)	(0.0485)
CIR	-0.0052	-0.0093	-0.0044***
	(0.0033)	(0.0101)	(0.0023)
FC	-0.0044***	-0.0064***	-0.0011
	(0.0023)	(0.0033)	(0.0022)
GDPGROWTH	-0.0083	0.0892**	-0.0732***
	(0.0171)	(0.0412)	(0.0131)
INFLATION	0.0222	0.0431	-0.0605**
	(0.0202)	(0.0352)	(0.0304)
C	0.7531	6.5542	2.4104
	(3.1911)	(4.7155)	(2.5491)
No of Obs	15,468	4,351	11,117
No of Banks	4,995	1,786	3,209
F-Test	9.97***	13.42***	24.39***

Notes: The table reports results from panel data fixed effect model of the effects of bank- specific characteristics and macroeconomic factors on bank profitability. The dependent variable is the return on average assets NIM. Standard errors are reported in paranthesis. For the notation of the variables see Table 2. The period covers the years from 2011 to 2015. The *, **, and *** denotes statistical significance of the difference at the 0.10, 0.05, and 0.01 level.

Table 9). First of all, in contrast to the results for ROAA, liquidity creation and bank size have no effect on NIM in all specifications. Then, Loan loss provisions to total loans ratio and cost to income ratio have significant negative effects on NIM in developed countries, while this relation is insignificant in emerging countries. Furthermore, GDP growth shows a significant positive effect on NIM in emerging countries, and funding cost ratio has a significant and reverse relation with NIM in the same market. While GDP growth and inflation show a negative and significant effect on NIM in developed countries.

6. Conclusion

Banking profitability differs widely as commercial banks have to deal with different macroeconomic environments, different tax policies, and different institutional realities.

By applying the fixed effect on a panel data set of commercial banks across 6 developed and 5 emerging countries over the period from 2011 to 2015, this paper analyzes how much liquidity banks create and how bank characteristics (including liquidity creation) and macroeconomic variables affect bank profitability. Significant differences are proved in profitability (as measured by the ROAA, ROAE and net interest margin variables).

Moreover, the results show that the liquidity creation has a significant negative effect on bank profitability in emerging countries (ROAA) and developed countries (ROAE). This is consistent with the expected bankruptcy cost hypothesis, which supposes that liquidity creation is negatively correlated to bank profitability. A higher level of illiquidity risk because the liquidity creation increases the likelihood of bankruptcy, hence lowering bank profitability.

Bank profits are also an imperative source of equity. If banks do not pay out (all of) their profits and keep them as equity, such a strategy should lead to safer banks. Consequently, high profits possibly promote a country's financial stability. Our results related to the equity to assets ratio support this relation. However, the capital ratio has a positive significant effect on bank profitability in all specifications. Therefore, banks with a higher equity to assets ratio are relatively more profitable. This result seems very interesting and of great importance also in light of the current discussions concerning the capital adequacy ratios (Basel III).

The coefficients of asset management quality measure, operating income to total assets, are significantly positive. In fact, the more quality of asset management, the higher is its profitability. The coefficients of the efficiency measure are significantly negative. It shows that an efficient cost management is a

requirement to improve the profitability of banks. Interestingly, it is harder to increase bank profitability by efficiency gains.

Credit risk has a statistically significant negative and rather strong effect on the bank profitability for both emerging and developed countries. This means, the control of credit quality remains an important issue, particularly in the face of the current economic slowdown. Macroeconomic factors such as GDP growth and inflation play vital role for banks in both markets. Therefore, macroeconomic policies in these countries are important.

Prominently, policies aiming to control inflation are an important priority in fostering financial intermediation. In particular, Inflation rate has a negative significant effect on profitability in emerging countries. In fact, inflation is not anticipated and banks do not adjust their interest rates correctly; and that costs may increase faster than revenues and hereafter affect bank profitability adversely. However, Inflation rate has a significant positive effect on profitability in developed countries. This means that inflation is anticipated and banks adjust their interest rates correctly; and costs may increase slower than revenues and hereafter affect bank profitability positively.

The effect of GDP growth in bank profitability is the same compared to the effect of inflation, which means that bank profits in developed countries usually increase in good economic times.

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Appendix

Table 10. Univariate tests: mean of ROAE in different subsamples by market category

	ALL			Emerging			Developed		
	Low (0)	High (1)	Diff	Low (0)	High (1)	Diff	Low (0)	High (1)	Diff
LC	6.708	4.534	2.174***	5.458	5.704	-0.246	6.897	4.376	2.521***
AM	6.276	4.966	1.31***	6.211	4.951	1.26**	7.366	3.907	3.46***
SIZE	3.368	7.874	-4.507***	4.44	6.722	-2.283***	3.222	8.052	-4.831***
DEPOST	4.256	6.986	-2.731***	4.626	6.536	-1.91***	3.629	7.645	-4.017***
CA	6.46	4.782	1.678***	5.522	5.64	-0.119	7.348	3.925	3.424***
LOAN	7.939	3.302	4.638***	9.317	1.832	7.486***	8.011	3.243	4.769***
CIR	9.125	2.117	7.008***	10.867	0.292	10.576***	8.685	2.586	6.099***
FC	6.924	4.318	2.606***	7.999	3.162	4.837***	8.276	2.997	5.279***
GDP GROWTH	3.719	7.8	-4.081***	3.946	7.67	-3.725***	4.907	6.492	-1.585***
INFLATION	5.652	5.59	0.063	8.138	2.703	5.435***	5.896	5.205	0.692

Notes: The table reports the mean of the ROAE variable for different subsamples by market category. The subsample Low (High) contains all observations which are below (above) the median of the corresponding variable in the first column. For the notation of the variables see Table 2. The period covers the years from 2011 to 2015. The *, **, and *** denotes statistical significance of the difference at the 0.10, 0.05, and 0.01 level.

Table 11. Univariate tests: mean of NIM in different subsamples by market category

	ALL			Emerging			Developed		
	Low (0)	High (1)	Diff	Low (0)	High (1)	Diff	Low (0)	High (1)	Diff
LC	3.729	4.123	-0.394***	6.344	6.678	-0.334*	2.997	2.832	0.165***
AM	2.943	4.91	-1.968***	3.109	9.915	-6.807***	3.346	2.483	0.863***
SIZE	4.672	3.18	1.492***	8.445	4.576	3.87***	2.8	3.029	-0.23***
DEPOST	4.046	3.807	0.24***	7.279	5.743	1.537***	2.14	3.69	-1.55***
CA	3.155	4.698	-1.543***	4.312	8.711	-4.399***	3.307	2.523	0.785***
LOAN	2.989	4.864	-1.876***	4.723	8.304	-3.582***	2.776	3.054	-0.278***
CIR	4.133	3.719	0.415***	5.926	7.097	-1.172***	2.902	2.928	-0.027
FC	3.491	4.362	-0.872***	7.04	5.982	1.059***	3.71	2.12	1.591***
GDP GROWTH	4.39	3.395	0.995***	7.297	5.507	1.79***	2.951	2.872	0.08*
INFLATION	3.015	4.85	-1.836	6.071	7.007	-0.936	3.102	2.602	0.501

Notes: The table reports the mean of the NIM variable for different subsamples by market category. The subsample Low (High) contains all observations which are below (above) the median of the corresponding variable in the first column. For the notation of the variables see Table 2. The period covers the years from 2011 to 2015. The *, **, and *** denotes statistical significance of the difference at the 0.10, 0.05, and 0.01 level.