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The effects of capital buffers on profitability: An empirical study

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Abstract

This paper measures the effect of capital buffers and other determinants on banks' profitability in 51 countries during the period of 2000 to 2012. We have found a nonlinear relationship between return on assets and capital buffers. While capital buffers have a positive impact on profitability, its excess can diminish banks' profits. Countries with non-competitive markets do not seem to change this relationship, although higher market power enhances profits. We also examine other determinants of profitability. Since minimal requirements of equity capital are one of the main regulatory instruments for preventing financial risks, we hope that the results of this letter can help financial authorities to also understand the effects of capital buffers on profits.

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1 Introduction

The increasing interconnectedness between financial markets around the world exposes the problem faced by international authorities regarding the transmission of financial shocks across countries. Since the financial crisis of 2008, international authorities have started discussing methods to strengthen the capital structure of banks in order to prevent conditions that could generate another financial crisis. One of the main regulatory instruments is the increase of minimal requirements of equity capital in order to serve as a countercyclical capital buffer that can absorb losses during bad times.

Although the importance of capital buffers were enlightened by Basel III accord, the main focus of the discussion was stability, and little emphasis has been given to the effects of capital buffers on profitability. Admati et al. (2010) cites a series of arguments in favor of more equity capital, showing that equity is not socially costly and its increase can reduce the probability of systemic crisis. Tabak et al. (2016) argument that stronger banking supervision is positively related to banking stability. The main motivation of this letter is to understand the effect that larger capital buffers has on bank profitability, instead of risk taking.

There are two main theories about the effect of capitalization on profitability among scholars. The first one defends that banks with more equity can use the excess of capital as cushion during recession phases, resulting in a guidance of creditworthiness which reduces funding costs and thus improves bank performance. There are empirical evidences that institutions with more equity capital in relation to assets tend to have higher profits comparing to those who have not - the evidences include Athanasoglou et al. (2008) for Greece, Garcia-Herrero et al. (2009) for China, Pasiouras and Kosmidou (2007) for European Union and Mirzaei et al. (2013) for some emerging and advanced economies. The other view suggests that since equity capital is costly, having a large amount of reserve can be inefficient and it may lead to a decrease in profits. Dietrich and Wanzenried (2011) found a negative effect of capitalization on profitability for Swiss banks, during the 2007-2009 period. Other authors, such as Kosmidou et al. (2007), found no relationship between profits and the level of capitalization on a study of Greek banks operating on foreign markets. Recently, Tran et al. (2016) has shown that regulatory capital is negatively related to bank profitability for higher capitalized banks but positively related to profitability for lower capitalized banks, while Khan et al. (2016) found evidence that bank size and capital buffers usually limit banks from taking more risk when they have lower funding liquidity risk, proxied by higher deposit ratios. The lower risk taking attitude of banks may also affect their profits, so that capital requirements regulations may represent a significant impact on bank's risk and profits.

Although these works addressed the relationship between capital requirements and profitability for some specific countries, there are no comprehensive cross country evidences about this relationship, specially when we consider measures of capital buffer such as the difference between the bank's capital ratio and the minimal capital requirements expressed by the regulatory ratio instead of the equity-to-assets ratio. For that purpose, we used an unbalanced panel data of 4555 banks from 51 different countries during the period of 2000 and 2012. This study can enlighten and support the discussion of whether the excess of capital above minimal requirements may harm the bank sector. We also study other determinants of banks profitability, such as competition, measured by the Lerner Index, liquidity, the GDP cycle, and other bank-specific and macroeconomic variables. According to the literature, higher market power can affect profitability positively (Maudos and de Guevara, 2004; Chen and Liao, 2011), while larger banks may have higher costs of management that can cause a decrease on profitability (Mirzaei et al., 2013; Kosmidou et al., 2007; Stiroh and Rumble, 2006) and higher liquidity is

expected to generate lower profits since liquid assets usually have lower rates of return (Chen and Liao, 2011).

2 Data and Method

To evaluate the effect of capital buffers and other determinants on profitability, we used an unbalanced panel data of 4555 banks from 51 countries during the period of 2000 and 2012. The large number of countries included in the sample is helpful to detect common factors that influence profitability which are not country specific. Also, the sample from 2000 to 2012 is able to capture the dynamics of the relationship between the variables before and after the 2008 financial crisis. This is specially relevant since the importance of capital buffer, one of the main variables addressed in this study, was increased during the post crisis period.

Our model consists of a fixed effect panel data with robust clustered standard errors by country. The dependent variable is the Return on Assets (ROA) for each bank and the explanatory variables include the Lerner Index, the capital buffer and its square, and interaction terms between these variables. The Lerner index varies from zero, which represents perfect competition, to one, which represents a monopoly. The interaction between the Lerner index and Capital Buffer measures if the impact of Capital Buffer on profits is intensified in less competitive markets, where profit margins are higher. In competitive markets, banks are pressured to operate with a minimum capital buffer, while there is more discretionary choices in collusive markets that may change the magnitude of the relationship between capital buffer and profitability.

We also include bank-specific and macroeconomic control variables. Our measure of capital buffer is the difference between the bank's capital ratio and the regulatory ratio. The capital ratio is the percentage of a bank's capital to its risk-weighted assets, while the regulatory ratio is the amount of capital a bank has to hold as required by its financial regulator, measured in percentage. The regulatory ratio varies across countries and the data are taken from Barth et al. (2004). Our empirical model can be summarized in the following equation:

$$\begin{aligned} \text{ROA}_{ikt} &= \beta_0 + \beta_1 \text{Lerner Index}_{kt} + \beta_2 \text{Capital Buffer}_{ikt} + \beta_3 \text{Capital Buffer}^2_{ikt} \\ &+ \beta_4 \text{Lerner Index}_{kt} * \text{Capital Buffer}_{ikt} \\ &+ \beta_5 \text{Lerner Index}_{kt} * \text{Capital Buffer}^2_{ikt} \\ &+ \beta^m_6 \text{Macroeconomic Controls}^m_{kt} \\ &+ \beta^l_7 \text{Bank-specific Controls}^l_{ikt} + \varepsilon_{ikt}, \end{aligned} \tag{1}$$

where i refers to the bank, k to the country, and t to the time period in years. For each bank, the control variables include the liquidity ratio, the deposit ratio, the Non-Interest Income (NII), and the cost to assets ratio, calculated by the ratio of total expenses on total assets. All bank-specific variables are taken from BankScope. For each country, we add the Property Rights Index and the Financial Freedom Index, taken from the Heritage Foundation; the GDP cycle (in percentage) calculated from a HP filter, the consumer price index and the domestic credit provided to the private sector as percentage of the GDP, all taken from the World Bank's WDI.

3 Results

Table I presents our main results. In each column we show a different specification of the model in equation 1, based on different interaction terms. The results show that capital buffer

has a positive impact on profits, while the square of capital buffer has a negative impact on profits. This indicates that more capitalized banks tend to perform better, but excess of capital buffer may affect profits negatively. The quadratic relationship between ROA and Capital Buffer estimated in columns 3 and 4 of Table I shows that an increase of 1% in the capital buffer may have an impact of around 0.1% on ROA, and the optimal point of this quadratic function occurs only when capital buffer exceeds 20%, which is when the slope of the function becomes negative and an increase of capital buffer starts to have a negative impact on profits.

Table I: Does Capital Buffer Increase Banks' Profitability?

Variables	[1] ROA (%)	[2] ROA (%)	[3] ROA (%)	[4] ROA (%)
Lerner Index$_{kt}$	1.436*	1.249	1.465**	1.046
	(0.776)	(0.928)	(0.713)	(0.913)
Capital Buffer (%)$_{ikt}$	0.051**	0.034	0.132***	0.091*
	(0.024)	(0.035)	(0.048)	(0.050)
Capital Buffer (%)$^2_{ikt}$			-0.002***	-0.002**
			(0.001)	(0.001)
Lerner Index$_{kt}$*Capital Buffer (%)$_{ikt}$		0.050		0.132
		(0.050)		(0.104)
Lerner Index$_{kt}$*Capital Buffer (%)$^2_{ikt}$				-0.001
				(0.002)
Liquidity Ratio$_{it}$	-0.014	-0.014	-0.011	-0.010
	(0.008)	(0.008)	(0.009)	(0.008)
Deposit Ratio$_{it}$	0.006	0.006	0.004	0.004
	(0.006)	(0.006)	(0.005)	(0.005)
NII$_{it}$	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Cost to Assets$_{it}$	-0.014	-0.013	-0.013	-0.012
	(0.008)	(0.008)	(0.008)	(0.008)
GDP Cycle$_{kt}$ (%)	0.083*	0.082*	0.093**	0.090**
	(0.046)	(0.046)	(0.044)	(0.044)
Cons. Price Index$_{kt}$ (%)	0.021	0.021	0.018	0.018
	(0.025)	(0.025)	(0.024)	(0.025)
Property Rights Index$_{kt}$	-0.030***	-0.030***	-0.031***	-0.029***
	(0.007)	(0.008)	(0.007)	(0.007)
Financial Freedom Index$_{kt}$	0.010***	0.010***	0.011***	0.011***
	(0.003)	(0.004)	(0.003)	(0.004)
Dom Credit to Private Sector$_{kt}$	-0.005	-0.005	-0.004	-0.004
	(0.003)	(0.004)	(0.003)	(0.003)
Constant	2.862***	2.853***	2.771***	2.740***
	(0.738)	(0.748)	(0.700)	(0.727)
Year Dummies	Yes	Yes	Yes	Yes
Observations	40,684	40,684	40,684	40,684
R-squared	0.059	0.059	0.081	0.083
Number of Banks	4,555	4,555	4,555	4,555

Note: This table presents the fixed-effects regression of return on assets (ROA) against capital buffer, Lerner Index and a set of control variables. The subscript t refers to the year, i to banks, and k to countries. Robust standard errors clustered by country in parentheses. **** p<0.01, ** p<0.05, * p<0.1.

This evidence supports both theories of the effect of capitalization on profitability. On the one hand, banks with capital buffers can signal to the market their financial strength, and through their creditworthiness, they can reduce their funding costs. As a result, this reduction on funding costs tends to have a positive impact on profitability. Pasiouras and Kosmidou (2007), Athanasoglou et al. (2008) and Garcia-Herrero et al. (2009) also found that more capitalized banks tend to perform better. On the other hand, a large amount of reserve can be inefficient and it may lead to a decrease in profits. Dietrich and Wanzenried (2011) found a negative effect of capitalization on profitability for Swiss banks, supporting this evidence. Also, the explanation of our results can be found by the conventional risk-return assumption that equity capital is costly.

Our model also indicates that higher market power, measured by the Lerner index, enhances profits. Banks can exercise their power over product prices ensuring higher profitability (Maudos and de Guevara, 2004; Chen and Liao, 2011). The interaction between the Lerner Index and Capital Buffer shows a positive sign, but the effect is not significant. We included those interaction terms to measure if capital buffer has a different effect on profits when markets are non-competitive, but this does not seem to be the case. These results are robust to using the Herfindahl-Hirschman Index (HHI) as the bank competition/concentration variable.

With the exception of the Non-Interest Income, which shows a positive effect on profits, the other bank-specific variables do not seem to explain profitability. Liquidity ratio and cost to assets had a negative effect on profits while the deposit ratio had a positive effect, as expected, but they were not statistically significant. Instead, macroeconomic variables such as the GDP Cycle, the Property Rights Index and the Financial Freedom Index explained a good amount of the profits generated by banks. Our model shows that profits are pro-cyclical. This evidence supports the fact that the growth of economic activity can influence net interest income via lending activities and also diminishes the necessity of provision, since the number of defaults during economic boom decreases significantly (Albertazzi and Gambacorta, 2009). Although the positive relationship between Consumer Price Index (CPI) and profitability may indicate that banks have the ability to anticipate future inflation rates, making adjustments in interest rates faster than the increase of costs, we found no statistical significance for this result. Overall, we show that market structure and country institutions play a crucial role in determining banks profits, but capital buffers also affect profitability in a non linear fashion.

4 Final considerations

This letter has been discussing the effect of capital buffers and other determinants on banks' profitability. We found a nonlinear relationship between return on assets and capital buffers. This result suggests that banks which maintain capital above minimal requirements imposed by financial authorities can benefit from its creditworthiness by reducing funding costs and thus improving profitability. However, capital buffers in excess can be harmful to bank performance, since equity capital is costly and excessive reserves diminishes profitability. This evidence synthesizes the two main theories about the effect of capitalization on profitability according to the current literature.

Recent discussions have suggested the increase of minimal requirements of equity capital in order to serve as a countercyclical measure for financial markets stability. The dual evidence of the effect of capital buffers on profits presented in this letter may be helpful in order to understand how regulatory instruments may affect not only systemic risk but also banks' profitability.

We also presented evidence of other determinants of profitability. Banks operating in less

competitive markets are more profitable than those who operate in competitive environments, although the capital buffer effect on profits does not change in non-competitive markets. Banks' profits are also specially influenced by institutional framework and economic cycles. Future research may focus on understanding the limits where minimal capital requirements begin to harm profits and thus affect performance of banks.

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