



PRO-CYCLICAL EFFECT ON CAPITAL ADEQUACY OF COMMERCIAL BANKS IN CHINA

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Annotation

The procyclicality of the regulatory capital requirement in the aftermath of the international finance crisis have been paid a lot of attention by researcher and regulators. It is pointed out that the risk-sensitive capital requirement in Basel Accord II drives the problem of procyclicality which amplified the economic cycle fluctuation and made the banking system a shock amplifier while not a shock absorber. In this paper, on the basis of China's 16 major commercial banks in 2004-2014 panel data, the researcher analyzes the relationship between macro-economic cycle and capital adequacy ratio to test whether there exists procyclical effect or not within. The empirical result shows that the capital adequacy ratio changes have procyclical effect on China's commercial banks.

KEY WORDS: Capital adequacy ratio; pro-cyclical effect; pro-cyclicality; macro-economic cycle; Basel Accord II; panel data.

Introduction

After the global financial crisis in 2008, the procyclicality of the financial system have been paid a lots of attention by researcher and regulation. The Financial Stability Board's report (FSF 2008) defined procyclicality as "the mutually reinforcing ("positive feedback") mechanisms through which the financial system can amplify business fluctuations and possibly cause or exacerbate financial instability". When the market boom, the transaction prices lead to an overestimation of the value of the relevant product; when the market downturn, the transaction prices lead to an underestimation of prices of related products. This positive feedback mechanisms between the financial system and the real economy defined by FSB would enlarge boom and bust cycles, exacerbate cyclical fluctuations in the economy and lead to financial instability or enhanced (FSF 2008). If the economy and fluctuations in the economy to maintain a positive relationship, then there is pro-cyclical effect, otherwise the counter-cyclical effect exists.

The most typical manifestation of procyclicality is from the credit activities of financial institutions and promote the formation of the economic cycle or exacerbate cyclical fluctuations in the economy. When the economy is on the rise, the borrower's financial situation improved, the collateral value of the collateral rise, banks will usually expand credit issuing, leading to overheating of the economy. While when the economy entered a down cycle, the borrower's financial situation deteriorated, the collateral value has shrunk, bank credit contraction on prudent business principles, thereby further prolong and exacerbate the recession (FSF 2008; FSF 2009).

In the discussion on the procyclicality, one of the key point is about the procyclicality of the capital regulation in Basel Accord II. Based on the requirement of Basel Accord II, banks could adopt the standardized approach or internal rating approach to measure credit risk capital requirement. The standardized approach measure credit risk by external rating like rating from Moody, Standard & Poor's. While internal rating-based approach (IRB) applied some risk parameters to measure capital requirements, such as probability of default rating (PD), lost given default (LGD), exposure at default (EAD) and maturity (M) (Kashyap et al 2004). Those parameters are very sensitive to the risk, thus significantly improving the risk sensitivity of capital regulation. On the other hand, there is a positive correlation between risk sensitivity and procyclicality of capital regulation (Turner 2009). Increase of risk sensitivity must be accompanied by enhanced procyclicality if bank adopt IRB approach. When the economy is on the rise, the borrower's financial situation improved, their credit rating increases, resulting in lower PD, higher collateral prices and lower LGD of loan. Meanwhile the extraction ratio of loan commitments is reduced, credit conversion factor CCF is hence reduced, resulting in decline of EAD. When the economy entered a downward phase, the opposite is true (Gordy et al 2006). Under IRB approach, risk weight function was given by the regulatory authorities and the risk parameters are as input variables in risk weight function. So the procyclicality of these risk parameters directly converted to the procyclicality of risk weights and regulatory capital requirements, which means the regulatory capital requirements will fluctuate with the economic cycle movement.

Many scholars analyze procyclicality of regulatory capital from the theoretical and empirical perspectives. In this paper, based on China's 16 major commercial banks in 2004-2014 panel data, we analyze the relationship between macro-economic cycle and capital adequacy ratio, in order to probe into the issue whether there exist pro-cyclical effects of the capital adequacy ratio of China commercial banks.

This paper is organized as follows: Section 2 is literature review. Section 3 includes a brief introduction to methodology and the result of empirical study. Section 4 gives the conclusion.

Literature Review

In 1998, the Basel Committee revised the 1988 Capital Accord and formulated the New Capital Accord (Basel Accord II 2003). The discussions of procyclicality caused by Basel Accord II has widespread concerns and controversies in theory and practice. These correlated discussions on procyclicality of the new Capital Accord make Basel Committee decide to choose smoother risk weight function thus it can encourage banks to use the-cycle rating method to ease off a certain degree of its procyclicality. But the negative impact on the procyclicality of the new protocol on economic development may still exist.

After the international financial crisis in 2008, people have realized that the procyclicality of the financial system has deeply harmed financial stability and economic development. The external rules such as Basel Accord II, loan loss provision, fair value criterion and the interaction of internal factors between financial institutions have played a certain role in excessive credit growth and expansion of financial imbalances before the finance crisis as well as the sharp fall of the market, liquidity shortage and credit crunch after the crisis. Especially, the crisis exacerbated the panic selling and market liquidity shortages, hence followed by the formation of vicious circle: prices fall - the market value has shrunk - reduction of capital - sell - prices continue to fall - and liquidity shortage and credit crunch, which promoted the further spread of the crisis.

After a comprehensive analysis of the causes of the crisis the Financial Stability Forum submitted to the G7 finance ministers and central bank governors meeting for the reconstruction of the global financial system package in April 2008, it positioned the solutions of the pro-cyclical issues as an important aspect of strengthening macro-prudential supervision. It appeals to organize the relevant government departments, Basel Committee, Bank of International Settlements, CGFS, IMF, IOSCO, IASB and FASB and other international organizations to set up four specialized working groups to study regulatory capital supervision, loan loss provisions, incentives and pro-cyclical leverage and valuation management

respectively. In February 2009, the IMF released IMF (2009), and De Larosiere et al (2009), Turner (2009), Panetta et al (2009) and Brunnermerier et al (2009) all analyzed the source of procyclicality of the financial system and its relationship with the Finance Crisis, then made suggestions on how to release the procyclicality of the financial system.

Demyanyk & Hermert (2008) point out that the outbreak of the US sub-prime mortgage crisis in the financial system is the consequence of over procyclicality. And the economic cycle converted into the most important systemic risk faced by the banking system. Aspachs et al (2006) found that in order to meet the regulatory capital requirements of the New Basel Accord, banks will adjust the size of loan more substantial in the face of external shocks, thereby increase the fluctuations of economic. Heid (2007) also analyzed the capital-induced lending cycles and pro-cyclical effect on the macro-economy and found that the capital buffer plays a crucial role in soothing the impact of the volatility of capital requirements.

Some of researchers analyzed this problem from the perspectives of methodology. Bernanke & Blinder (1988) modified IS-LM model to present the important relationship of money-demand shocks with credit-demand shocks during the 1980s. Tanaka (2002) developed the modified IS-LM model based on Bernanke & Blinder (1988). By assessing the impact of the New Basel Accord, researchers drew the conclusion that a rise in credit risk may lead to a sharper loan contraction and Basel II may reduce the effectiveness of monetary policy as a tool for stimulating output during recessions. Estrella (2004) built a dynamic model of optimal bank capital in which the bank optimizes the costs associated with failure, holding capital, and flows of external capital to examine the procyclicality of bank capital. And she pointed out several solutions to reduce this problem via the model.

Other scholars empirically studied the impact of procyclical between economic cycle and capital adequacy ratio. Ayuso et al (2004) applied the panel data of Spanish commercial and savings banks from 1986 to 2000, to obtain the result that economic cycles and capital adequacy ratio have a significant negative correlation, and this relationship is asymmetric. Jokipii & Milne (2008) used panel of accounting data from 1997 to 2004 to deduce that capital buffers of the banks in the EU15 have a significant negative co-movement with the cycle. For banks in the accession countries there is significant positive co-movement. Bikker & Metzmakers (2004) based their multinational study on 29 OECD countries, which showed that the risk of individual banks have weak relationship with economic volatility. Risk-weighted capital adequacy ratio under the New Basel Accord may not cause significant pro-cyclical effect.

Methodology

This paper proposed the model in Ayuso et al (2004) and Estrella (2004) to analyze the relationship between macro-economic cycle and capital adequacy ratio. By establishing isostatic adjustment model, we assumed that the dynamic adjustment of bank capital follows the formula below (Ayuso et al 2004). Firstly, we assumed:

$$K_t = K_{t-1} + I_t \quad (1)$$

Here, K_t is the capital of the bank at time T , K_{t-1} is bank capital levels in $t-1$ period. I_t are changes of the bank's total capital in period T , including retained earnings, the IPO and the number of shares repurchased.

Banks hold capital mainly from three types of motivation: First, to reduce the cost of financial distress; Second, to reduce the cost of external financing when capital insufficient; and third, to reduce the information asymmetry between shareholders and depositors (Berger et al 1995). We assumed that the holding cost of bank capital including these three elements, then it is:

$$Cost_t = (\alpha_t - \gamma_t)K_t + \frac{1}{2}\delta_t I_t^2 \quad (2)$$

Among the equation 2, α_t represents the risk - reward of capital, γ_t is the bankruptcy costs for banks (or regulatory penalties due to lack of capital), and δ_t is capital adjustment costs.

One important goal of banking operation is the cost minimization. Under the above assumptions, the optimization model is as below:

$$\begin{aligned} & \min E_t \left(\sum_{i=0}^{\infty} \beta^i \text{cost}_{t+i} \right) \\ & s.t. K_t = K_{t-1} + I_t \\ & Cost_t = (\alpha_t - \gamma_t)K_t + \frac{1}{2}\delta_t I_t^2 \end{aligned} \quad (3)$$

β is the discount rate, i is the year. After calculating the first-order derivative to cost, we can get:

$$I_t = E_t \left(\frac{1}{\delta_t} \sum_{i=0}^{\infty} \beta^i (\gamma_{t+i} - \alpha_{t+i}) \right) \quad (4)$$

In this case, the bank costs are minimized. Then we substituted the equation 4 into equation 1, it is

$$E_t(K_t) = K_{t-1} + E_t \left(\frac{1}{\delta_t} \sum_{i=0}^{\infty} \beta^i (\gamma_{t+i} - \alpha_{t+i}) \right) \quad (5)$$

After minus minimum regulatory capital requirements in both sides of equation 5, we obtain capital buffer. The

overall expectations equal to actual observation plus random error term in equation 6:

$$(K - \bar{K})_t = (K - \bar{K})_{t-1} + E_t \left(\frac{1}{\delta_t} \sum_{i=0}^{\infty} \beta^i \gamma_{t+i} \right) - E_t \left(\frac{1}{\delta_t} \sum_{i=0}^{\infty} \beta^i \alpha_{t+i} \right) + \varepsilon_t \quad (6)$$

Empirical Test and Results

Based on the above theoretical analysis, the main empirical test model is as follows:

$$Buf_{i,t} = \beta_0 + \beta_1 Buf_{i,t-1} + \beta_2 GGDP_t + \beta_3 ROA_{i,t} + \beta_4 NPL_{i,t} + \varepsilon_{i,t} \quad (7)$$

Here, explained variable $Buf_{i,t}$ represent excess capital adequacy ratio of bank i at time t . It is the real bank capital adequacy ratio minus the minimum regulatory capital requirement 8%, which reflects the part of banks holding capital without being subject to regulatory constraints. This part of capital would increase investor's confidence, as well as expand investment opportunities in the future (Jokipii, T.; Milne, A. 2008). In this paper, we mainly test how the macroeconomic cycle imposes impact on this variable.

There are 4 explanatory variables, (1) $Buf_{i,t-1}$ is the first order lag of Buf , which is used to estimate the adjustment costs of capital adequacy ratio. The greater β_1 , the higher adjustment costs; (2) $GGDP$ is GDP growth rate which stands for macroeconomic cycle here. It is the main factor we would test in this paper. If the regression coefficient β_2 is greater than 0, it means there exists a pro-cyclical effect between the economic cycle and the capital adequacy ratio; (3) ROA is bank profitability. The higher profitability means more retained earnings can be converted into capital, it also means higher quality of asset management and the overall risk is small on bank side. So it is assumed that the bank profitability and excess capital are in positive relationship; (4) NPL is non-performing loan, which is on behalf of the risk of assets here.

In this paper, we collected panel data of 16 major commercial banks in China from 2004 to 2014, which including five large commercial banks, eight joint-stock banks, and three city commercial banks. Data include capital adequacy ratio, return on assets (ROA), non-performing loan ratio (NPL) of these banks and the annual GDP growth rate of China. All the data are collected from WIND database.

Firstly, we draw the graph of the trend of annual GDP growth rate of China from 2004 to 2014 as shown in Figure 1.

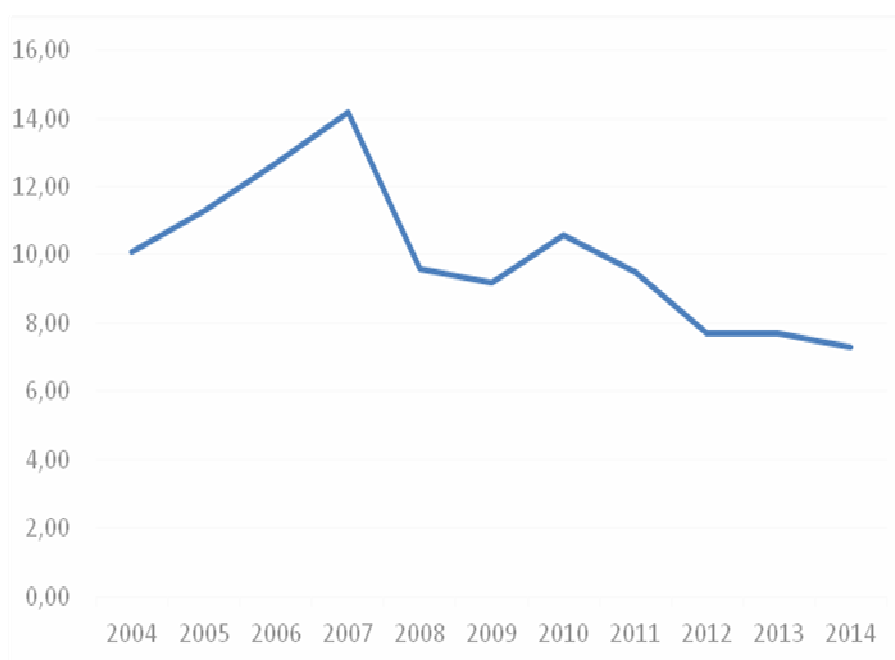


Fig. 1. Trend of Annual GDP Growth Rate of China from 2004-2014
(Source: WIND Database)

In this research, GDP growth rate are induced to stand for business cycles as mentioned before. From Figure 1, we can see the growth rate of GDP in China increased from 2004 to 2007 and decreased sharply after two years, then raised slightly from 2009 to 2010. After that, it

declined steady. The changes of GDP growth rate show a movement of business cycle which we can applied in the analysis.

Table 1 shows the basic statistical descriptions of all the variables in equation 7.

Table 1. Basic Statistical Description of the Variables

Variable		Mean	Std. Dev.	Min	Max	Observations
Buf	overall	3.458977	3.494298	-9.47	22.67	N = 176
	between		2.151305	-0.7745456	7.766364	n = 16
	within		2.801155	-5.236477	18.36261	T = 11
Buf _{t-1}	overall	3.346125	3.62856	-9.47	22.67	N = 160
	between		2.342769	-1.276	8.244	n = 16
	within		2.826404	-4.929875	17.77212	T = 10
GGDP	overall	9.990909	2.048756	7.3	14.2	N = 176
	between		0	9.990909	9.990909	n = 16
	within		2.048756	7.3	14.2	T = 11
ROA	overall	0.9891477	0.3373135	0.02	1.72	N = 176
	between		0.1912601	0.6236364	1.29	n = 16
	within		0.2815853	0.1464204	1.520966	T = 11
NPL	overall	2.504091	4.138635	0.33	26.17	N = 176
	between		2.296214	0.7163636	10.38545	n = 16
	within		3.486688	-6.661364	19.92318	T = 11

(Source: Own construction)

Using Equation 7, linear multiple regression analysis has been tested by statistical software Stata, and we can get the following results of the relationships between the bank's excess capital adequacy ratio and GDP growth rates and other variables.

The test results of random-effects Generalized Least Squares regression at 10%, 5% and 1% confidence level has been shown in Table 2, Table 3 and Table 4.

Table 2. The Test Results of GLS Regression in 1% level

Random- effects GLS Regression				Number of observations = 160		
Group variable: Bank				Number of groups = 16		
R ² : within = 0.4107				Obs per group: min =10		
between = 0.9314				avg =10		
overall =0.6040				max =10		
Correlation(u _i , x) = 0 (assumed)				Wald chi-square(4) = 236.41		
				Prob > chi-square = 0.0000		
	Coefficient	Std. Err.	Z	P > z	99% Confidence Interval	
Buf _{t-1}	0.5275485	0.0603546	8.74	0.000	0.3720854	0.6830116
GGDP	0.3794157	0.0878986	4.32	0.000	0.1530038	0.6058275
ROA	3.586031	0.7995008	4.49	0.000	1.526653	5.645408
NPL	-0.0333659	0.0573377	-0.58	0.561	-0.1810581	0.1143264
Constant	-5.350382	1.296441	-4.13	0.000	-8.689792	-0.2010973
Sigma_u	0					
Sigma_e	2.0737077					
rho	0 (fraction of variance due to u _i)					

(Source: Own construction)

Table 3. The Test Results of GLS Regression at 5% Level

Random- effects GLS Regression				Number of observations = 160		
Group variable: Bank				Number of groups = 16		
R ² : within = 0.4107				Obs per group: min =10		
between = 0.9314				avg =10		
overall =0.6040				max =10		
Correlation(u _i , x) = 0 (assumed)				Wald chi-square(4) = 236.41		
				Prob > chi-square = 0.0000		
	Coefficient	Std. Err.	Z	P > z	95% Confidence Interval	
Buf _{t-1}	0.5275485	0.0603546	8.74	0.000	0.4092557	0.6458413
GGDP	0.3794157	0.0878986	4.32	0.000	0.2071375	0.5516938
ROA	3.586031	0.7995008	4.49	0.000	2.019038	5.153023
NPL	-0.0333659	0.0573377	-0.58	0.561	-0.1457458	0.0790141
Constant	-5.350382	1.296441	-4.13	0.000	-7.891359	-2.809405
Sigma_u	0					
Sigma_e	2.0737077					
rho	0 (fraction of variance due to u _i)					

(Source: Own construction)

Table 4. The Test Results of GLS Regression at 10% Level

Random- effects GLS Regression				Number of observations = 160		
Group variable: Bank				Number of groups = 16		
R ² : within = 0.4127				Obs per group: min =10		
between = 0.9294				avg =10		
overall =0.6062				max =10		
Correlation(u _i , x) = 0 (assumed)				Wald chi-square(4) = 238.64		
				Prob > chi-square = 0.0000		
	Coefficient	Std. Err.	Z	P > z	90% Confidence Interval	
Buf _{t-1}	0.5343186	0.0602455	8.87	0.000	0.4352235	0.6334137
GGDP	0.3834441	0.0878248	4.37	0.000	0.2389852	0.5279029
ROA	3.575044	0.7946035	4.50	0.000	2.268038	4.882051
NPL	-0.0342572	0.0572449	-0.60	0.550	-0.1284168	0.0599023
Constant	-5.412109	1.293269	-4.18	0.000	-7.539348	-3.28487
Sigma_u	0					
Sigma_e	2.0683356					
rho	0 (fraction of variance due to u _i)					

(Source: Own construction)

As we can see from the empirical test results in Table 2, Table 3 and Table 4, the macroeconomic indicators GDP growth rate (GGDP) has significant impact on the commercial bank's excess capital adequacy ratio at confidence level 1%, 5% and 10%. The coefficient β_2 is positive, indicating that the capital adequacy rate of China's commercial bank have pro-cyclical effect. As we discussed before, pro-cyclical effect on the capital adequacy ratio means that, when the economic cycle goes up, the borrower's financial situation improved, their credit rating increases, resulting in lower PD, higher collateral prices and lower LGD of loan, the risk capital requirement decrease comparatively. With a constant capital holding in one period, the excess capital increase comparatively. This part of excess capital adequacy of commercial banks would be improved to support more substantial credit expansion, which will promote an upsurge of further economic development (Kashyap, A. K.; Stein, J. C. 2004). While during the economic downturn, the level of capital adequacy would be reduced. Meanwhile, the financing cost of banks equity is higher, commercial banks have to shrink their balance-sheets and reduce the supply of credit which would exacerbate the cyclical fluctuations of the real economy (Estrella 2004). We could hereby reach the conclusion that when GDP growth increase per 1%, the average excess capital adequacy ratio will accordingly be increased by 0.379% in Table 2 and Table 3, by 0.383% in Table 4 respectively.

In addition, the table 2, 3&4 also show that the coefficient of $\text{Buf}_{i,t-1}$ are significantly positive at confidence level 1%, 5% and 10%. It demonstrates that the specification on dynamic adjustment model of capital adequacy ratio is reasonable. There is a significant positive correlation between the return on assets (ROA) and excess capital also, which indicates banks with higher profitability would have higher capital adequacy levels. NPL ratio increase would reduce excess capital ratios. It also shows that there is a negative correlation between the explanatory variables and NPL but the result is not significant here.

Conclusions

Bank capital adequacy ratio is the basic indicator to measure whether banks are in the stable operation. The level of capital adequacy ratio of a bank not only affects the ability of the bank issuing the credit, but also affects the ability to bear risk. The procyclicality of bank capital would lead to expansive fluctuations in the economic cycle which may cause higher risk to banking system and the whole economics.

In this paper, we empirically analyze the procyclicality of bank capital based on China's 16 major commercial banks in 2004-2014 panel data. By applied the model in Ayuso et al. (2004) and Estrella (2004), we run the random-effects GLS regression to analyze the relationship

between macro-economic cycle and capital adequacy ratio. From the empirical results above, we can find a significant positive relationship between the excess capital adequacy ratio and macro-economic cycle which means there exists pro-cyclical effect in main banks of China.

References

- Aspachs, O., Goodhart, C., Segoviano, M., Tsomocos, D., & Zicchino, L. (2006). Searching for a metric for financial stability. *SPECIAL PAPER-LSE FINANCIAL MARKETS GROUP*, 167.
- Ayuso, J., Pérez, D., & Saurina, J. (2004). Are capital buffers pro-cyclical?: Evidence from Spanish panel data. *Journal of financial intermediation*, 13(2), 249-264.
- Basel Accord II (2003). Basel II: The New Basel Capital Accord-third consultative paper. Basel Committee on Banking Supervision, Bank for International Settlements. [Retrieved January 1, 2016], <<http://www.bis.org/bcbs/bcbscp3.htm>>
- Berger, A. N., Herring, R. J., & Szegö, G. P. (1995). The role of capital in financial institutions. *Journal of Banking & Finance*, 19(3), 393-430.
- Bernanke, B. S., Blinder, A. S. (1988). Credit money and aggregate demand. *American Economic Review*, 78(2), 435-439.
- Bikker, J., & Metzmakers, P. (2004). Is bank capital procyclical? A cross-country analysis. *DNB Working paper 009*, Netherlands Central Bank, Research Department.
- Brunnermeier, M. K., Crockett, A., Goodhart, C. A., Persaud, A., & Shin, H. S. (2009). *The fundamental principles of financial regulation* (Vol. 11). London: Centre for Economic Policy Research.
- De Larosiere, J., Balcerowicz, L., Issing, O., Masera, R., McCarthy, C., Nyberg, L., Perez Onno Ruding, J. (2009). The High-Level Group on financial supervision in the EU, Brussels. European Commission.
- Demyanyk, Y., & Van Hemert, O. (2008). Understanding the subprime mortgage crisis, Federal Reserve Bank of St. Louis, February, 29.
- Demyanyk, Y., & Van Hemert, O. (2011). Understanding the subprime mortgage crisis. *Review of Financial Studies*, 24(6), 1848-1880.
- Estrella, A. (2004). The cyclical behavior of optimal bank capital. *Journal of banking & finance*, 28(6), 1469-1498.
- FSF (2008). Addressing financial system procyclicality: a possible framework. Financial Stability Forum. [Retrieved January 20, 2016], <http://www.fsb.org/2009/04/r_0904e/>
- FSF (2009). Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System. Financial Stability Forum. [Retrieved January 20, 2016], <<http://www.fsb.org/2009/04/report-of-the-financial-stability-forum-on-addressing-procyclicality-in-the-financial-system/>>
- Gordy, M. B., & Howells, B. (2006). Procyclicality in Basel II: Can we treat the disease without killing the patient?. *Journal of Financial Intermediation*, 15(3), 395-417.

- Heid, F. (2007). The cyclical effects of the Basel II capital requirements. *Journal of Banking & Finance*, 31(12), 3885-3900.
- IMF (2009). Lessons of the financial crisis for future regulation of financial institutions and markets and for liquidity management. International Monetary Fund, International Capital Markets Department. <<http://www.imf.org/external/np/pp/eng/2009/020409.pdf>>
- Jokipii, T., & Milne, A. (2008). The cyclical behaviour of European bank capital buffers. *Journal of banking & finance*, 32(8), 1440-1451.
- Kashyap, A. K., & Stein, J. C. (2004). Cyclical implications of the Basel II capital standards. *Economic Perspectives-Federal Reserve Bank Of Chicago*, 28(1), 18-33.
- Panetta, F., Angelini, P., Albertazzi, U., Columba, F., Cornacchia, W., Di Cesare, A., ... & Santini, G. (2009). Financial sector pro-cyclicality: lessons from the crisis. *Bank of Italy Occasional Paper*, (44).
- Tanaka, M. (2002). How do bank capital and capital adequacy regulation affect the monetary transmission mechanism?. *CESifo working paper series*.
- Turner, A. (2009). *The Turner Review: A regulatory response to the global banking crisis* (Vol. 7). London: Financial Services Authority.
- WIND Database. [Retrieved January 10, 2016], <http://www.wind.com.cn/>
- Csaba Lentner (2015). The Structural Outline of the Development and Consolidation of Retail Foreign Currency Lending. *Public Finance Quarterly* 60. (3) 297-311.
- Csaba Lentner (2015). Uncertainty Factors in National Economy Planning – International Effects and Hungary's Outlook Up to 2050. *Central European Political Science Review* 16 (62). 9-26.

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