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Banking regulation and procyclicality – cross-country analysis in EMU

Abstract

In connection with Basel II regulation the main critique is that the New Capital Accord raises the procyclicality of the banking system. In this paper EMU-wide cross-country comparative analysis is used to test evolution of the capital buffers, the output gap and the financial structure index. The author searched for answers to the following questions: what factors are influencing the measure of capital buffers held by the bank above the minimum capital adequacy ratio (BIS ratio 8%); how the level of capital buffers is worked out by country; what relationship is there between the measure of capital buffers and a business cycle; and is there any relation between the extent of capital buffers and financial structure?

Keywords: banking regulation, EMU, procyclicality, financial structure, Basel II.
JEL Classification: F30, G21.

Introduction

Request of banking supervision has reached back a long time. Initially, the principal task of it was the assurance of the liquidity in case of the bankruptcy. Definition of the minimum reserve ratio served primarily as liquidity of individual banks and the banking system maintenance. Later this regulation got a complementary instrument of monetary policy. With application of the capital adequacy ratio the asset structure of bank balance-sheets was also examined. With refining the methodics and a more precise and efficient quantification of risk a measure of capital needed for prudent operation of a bank is definable. Financial markets globalization increased remarkably the risk of spreading crises. Both the international and the national authorities are interested in definition and measurement of assumed risks taken by banks. In New Capital Accord there is a possibility to evaluate the risk with internal models, besides the market risks and the credit and operational risk

Many researchers of international financial institutions and of the national authorities handle with examination of the Basel II's estimated results. One of the principal research areas is to define and measure the procyclicality of the New Capital Accord and to analyze the dimming facilities.

According to the Modigliani-Miller thesis, in the case of a perfect market the determination of capital leverage of the individual companies is irrelevant and has not any effects on its efficiency. The banks at reckoning of capital adequacy ratio need to hold minimum required capital, which is 8 percent of balance-sheet total corrected by on- and off-balance sheet items' riskiness. On one hand, this reflects a minimum measure of capital to be ordered to the assets. On the other hand, to some extent the regulator can determine capital leverage of an individual bank or the banking system as a whole. To be more precise, regulators' effect on evolution of equity capital/total liabilities ratio is through definition of minimum capital adequacy.

The aim of Basel I signed in 1988 was to solve the debt crisis and to be appreciated as a directive for the international payment system. There is no documentation from a fixing process about the measure of capital adequacy ratio. This is explained by the fact that the primary target was to establish an entire requirement for every bank. In international comparison the average value of the banks BIS ratio had grown steadily from the level of 8.7% in 1990 to 12% in 2001 (Bikker, Metzenmakers, 2004).

1. About the role of the capital buffer

In spite of the fact that the New Capital Accord is not changing the minimum extent of 8% of the capital adequacy ratio, the question occurs why the banks and the banking system hold significantly higher guaranty capital than the minimum one. The measure of capital buffer can be interpreted as a ratio, where the numerator is corrected guaranty capital held by the bank above the prescribed smallest quantity of capital requirements and the denominator is either total assets corrected by risk or the prescribed smallest quantity of capital requirements. Basel II can be equated with more risk sensitive regulation compared to Basel I signed in 1988 and also to the amendment with market risk approach signed in 1996. The new regulation enables mitigation of the gap between regulatory (prescribed by banking supervision/regulating authority) capital and economic (economically required) capital.

With application of the internal models the volatility of the bank's portfolio is part of minimum capital requirements. As a result, the volatility of bank's capitals and capital buffers increases significantly. From the regulators point of view high capital buffers held by banks are beneficial because they can contribute to the fulfilment of the additional capital requirements from the operational risk. Moreover,

the banks holding of risky portfolios can conform better to the more risk sensitive approach. In the absence of this, the capital adequacy ratio of banks in case of shock could fall with higher probability under the minimum level.

The literature explains holding of bank's capital buffer by a market discipline and avoidance of supervisory intervention (Borio, Furfine, Lowe, 2001). The undercapitalized banks can lose confidence in the market and jeopardize their reputation. Above the smallest amount a capital buffer can be considered consequently as insurance of a certain kind in relation to those cost, which would incur in the case of CAR fall at the forced capital increase. Price of the new capital, namely yield of capital or interest of subordinated debt, can be interpreted as the price of this insurance. The increasing insurance costs have a negative effect on capital buffer. Value of the insurance is dependant on bank uncertainty, namely what is the probability of an extent in CAR, at which the original ratio can not be restored without significant difficulties. Credit losses can emerge in the case of unexpected shocks or due to informational asymmetry of creditor-debtor relationship. In the latter case the bank can raise its knowledge related with risk exposure with ongoing monitoring of the individual projects. Due to economies of scale big banks are substituting less monitoring activity for capital buffer. Namely, the larger the extent of credit portfolio of an individual bank is, the smaller is the capital held by bank above the minimum BIS ratio. The portfolio diversification can also reduce the probability of a steep fall of capital adequacy ratio, which opportunity is proportionally growing with the size of the bank (Linquist K.-G., 2004).

If big banks can rely on the assistance of the government (too-big-to-fail) – an opportunity usually not available in crisis for small banks – then it serves as further explanation of decreasing capital buffer proportionally with the size of the bank. Presumably there is a positive relationship between thorough examination of banking supervision and bank's capital buffer. In the market competition the extent of overcapitalization can be defined as a signal of a bank's solvency. Its extent is depending on how much the given bank is under a severe competition, moreover, how the individual banks are positioning themselves compared to their market competitors. Berger, Herring, Szegő (1995) emphasize one of further possible aspects of capital buffer's holding, namely the help of it in exploiting the unexpected investment opportunities.

If a bank has capital buffer it can either deal with riskier business or strengthen this aquisition strategy. There is an alternative opportunity for banks to decrease their capital, namely they can refund the capital to the owners if they can use it more profitably out of the banking system. Several British banks which applied the strategy of shareholders value utilize this opportunity in a given advantageous time (Llewellyn, 2005). Those countries, in which the arm's length type deals dominate, proved to be better at exploitation of the new growth facilities due to better resource allocation (IMF, 2006). The extent of capital held by banks above the minimum level depends on costs of additional fund raisings. In a period of substantial economic growth the fall of the capital buffer can be estimated because more encouraging investment projects can be realized in this term. So the banks capital buffers are affording a chance to the market participants to blunt or enhance the procyclical effects of the regulations (both Basel I and Basel II).

Due to Basel II the procyclicality of banking capital adequacy ratio and capital buffer rise to presumably a certain extent. The second pillar of New Capital Accord specifies supervisory revision in connection with the internal models applied, in addition to stress tests. By means of this, in the case of recession, the negative effects of macro circumstances on a bank portfolio can be estimated. Such a model can determine the riskiness of a portfolio more precisely and be appropriate for definition of the requested capital buffer.

Table 1. National minimum level of capital adequacy ratio (also where prescriptions are different from 8% in EU)

	Minimum CAR	Date of introduction	Reason
Great Britain	9%	1979	
Cyprus	8%	1997	
	10%	2001	Change in market structure
Czech Republic	8%	1992	
Estonia	10%	1997	Quick increase in banks assets and change in operational circumstances
Hungary	8%	1991	
Latvia	10%	1997	
	8%	2004	
Lithuania	10%	1997	
	8%	2005	
Malta	8%	1994	
Poland	8%	1992	
Slovak Republic	8%	1997	
Slovenia	8%	2002	

Source: Jokipii, Milne (2006).

A creditworthiness of debtors worsens in recession. Average downgrading, on one side, is due to the worsening growth outlooks. On the other side, in light of a longer time horizon the ratings would not have to move in the same direction with the business cycle. At a time of boom the individual national supervisory institutions could order the banks to maintain a targeted capital adequacy ratio. It is known that in the European Union and also in EMU the scope of action of the national supervisory institution is large – based also on the new directive in European Union (CRD) – so the national authorities can impose special regulations on their own market.

In all EMU countries the requirement is 8%, so it equals BIS ratio. It would be estimated with the help of an applicable model which is the common CAR band, which would be fit at given periods of the business cycles. I think about a band where the stress CAR would also remain above the minimally prescribed 8%. The central banks in their stability reports calculate stress CAR, considering negative effects of different macro variables, which refer to the banking system. In the case of individual banks this value could work out differently. With this it would be justifiable of an ideal CAR above the ratio of 8%. The holding of higher amounts of capital can serve as a signal for the market and to strengthen negotiation position. The recommendation to hold more capital than the minimum could embrace both micro and macro prudential elements. Jokipii, Milne (2006) pointed out that the capital buffers of New Member States of EU move in the same direction as business cycles, while in the Old Member States they are anticyclical. In my opinion, this movement is more a spontaneous, and not a conscious behavior characterizing the banking system. In the New Member States the external shocks can cause higher losses so the difference between the banking system's average CAR and stress CAR is much higher.

2. Relationship between the capital buffer and the output gap

Suyter (2004) examined the relationship between change of equity capital requirement and nominal GDP of Germany between 1997 and 2003. He pointed out an inverse relationship between them, which means, that the capital requirement is decreasing (is rising) if the nominal GDP is rising (is decreasing). This examination also strengthens the hypothesis that first pillar of Basel II based on PD (probability of default) intensifies the procyclical behavior of the banking system.

Ayuso, Pérez, Saurina (2002) found in their study a significant negative relationship between the business cycle and the capital buffer in the term examined with regard to Spanish institutions. The correlation is tighter at the time of the upturn than in time of recession. One percent increase in the GDP corresponded with a 17% decrease in the capital buffer. In the former studies the authors analyzed banks of given countries, while Jokipii, Milne (2006) focused on 486 banks in the EU in order to find relevant features in different bank types and country type in the period of 1998-2004. They classified the groups of countries and in addition the banks by size and type and attained the following results. The capital buffers of the big banks as well as the commercial and savings banks were anticyclical, while the small banks and cooperative bank moved in the same direction as business cycle.

Jokipii, Milne (2006) analyzed following groups of countries: EU25, EU15, group of Denmark, Sweden, Great Britain and the New Member States. The authors pointed out that in the former three groups of countries, the correlation between capital buffer and output gap (or GDP growth) is negative, namely they moved anticyclically.

In the case of New Member States the correlation is positive, namely at the time of upturn the banks are extending capital above the minimum level, which they use for covering the increased credit risk in time of recession. In that sense, authors consider the banking system of the country joined to the EU in 2004 more prudent than the OMS ones. The less efficient banks hold more capital than necessary. This is the market signal's value that the capital buffers in these countries are more remarkable, the credit supply is much lower, and the bank's GDP-proportional credit portfolio remained much under the level of EU15. These countries therefore, are expecting the widening of banking intermediation. In this case, increasing of the capital level can be interpreted as preparation of a credit expansion in the future.

Table 2 contains correlation coefficient between banks' individual ratios and the output gap. There is a negative relationship between provision and output in the examined countries (excluding the USA) as long as the profitability (excluding Germany) and the stock price vs output gap relationships are positive. The capital (capital/total assets) indicates varying correlation coefficients in the countries during the examined period (1980-2001).

Table 2. Correlation between output gap and different ratios of banking system

	Provision	Profitability	Equity price	Equity capital
Australia	-0,88	0,71	0,47	-0,39
Finland		0,81	0,43	0,04
Germany	-0,21	-0,42	0,18	0,20
Italy	-0,21	0,25	0,10	-0,25
Japan	-0,43	0,22	0,30	-0,25
Norway	-0,35	0,54	0,03	0,41
Spain	-0,41	0,84	0,32	0,06
Sweden	-0,83	0,60	0,26	-0,16
United Kingdom	-0,38	0,12	0,26	0,26
USA	0,14	0,24	0,12	-0,04

Source: Borio, Furfine, Lowe (2001).

3. Comparative analysis of capital buffer, output gap and financial structure in EMU

I prepared comparative analysis with the data of 12 countries from the Economic and Monetary Union with regard to the period of 1997-2004. The analysis between the output gap and the capital adequacy ratio. The average negative correlation between output gap and CAR means that if the output gap is rising (is decreasing), then the banks capital adequacy ratio is decreasing, namely this is the procyclicality of the banking system.

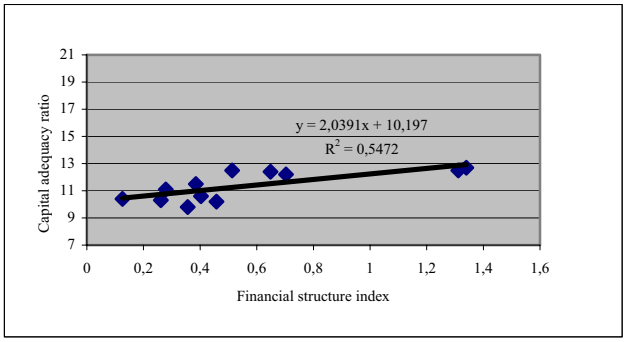
Table 3. Correlation between CAR and output gap in EMU (1997-2004)

	Correlation coefficient	R^2	Significance	t-value
Austria	-0,796*	0,63	0,018	-3,222
Belgium	-0,2900	0,09	0,481	-0,751
Germany	-0,4500	0,2	0,275	-1,2
Finland	-0,830*	0,69	0,011	-3,64
France	-0,3500	0,12	0,409	-0,888
Greece	0,0700	0,01	0,874	0,166
Ireland	-0,3100	0,1	0,454	-0,8
Italy	-0,5910	0,33	0,123	-1,793
Luxembourg	-0,6440	0,42	0,085	-2,062
The Netherlands	-0,711*	0,51	0,048	-2,48
Portugal	-0,1400	0,02	0,746	-0,34
Spain	-0,775*	0,65	0,024	-3,003

Note: * – correlation is significant at the 0,05 level (2-tailed). Data sources: author's calculations IMF Financial Stability Report, Bankscope, OECD.

The output gap is the difference between actual GDP and potential GDP divided by potential GDP. With the exception of Greece the correlation between CAR and output gap is negative and in the case of four countries (Austria, Finland, Spain and the Netherlands) this correlation is significant. I am using the notion "procyclically" ("anticyclically") in the case that a specific variable moves in the same direction or reverse direction to the business cycle, in contradistinction to Basel II, where the notion of procyclicality describes the amplification of business cycle. Stolz, Wedow (2005) mean by anticyclical behavior of capital buffers that average bank capital buffers are moving oppositely to economic cycles.

In national financial systems we can make a distinction between market-based and bank-based financial structures, and between arm's-length and relationship-based deals. Arm's-length deals are predominantly characteristic of the market-based financial structures, while the relationship-based deals are a feature of bank-based financial structures. However, the two approaches can be treated as a synonym only to an incomplete extent. Venture capital can be classified with the relationship-based deals typical in countries with market-based financial structure. New credit syndication can be classified to the arm's-length deals which are typical in bank-based countries.



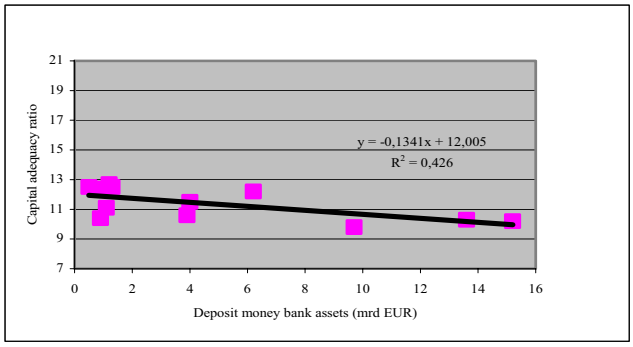
Data sources: author's calculations. Worldbank: Financial Structure Database, Bankscope.

Fig. 1. Correlation between capital adequacy ratio and financial structure index in EMU (1990-2001)

In the period under study there is a significant positive correlation between financial structure index (stock market capitalization divided by deposit money bank assets) and capital adequacy ratio. With regard to the fact that I used average figures by country the variations inside the country are not in place.

The correlation (R^2: 0,5472, significance level: 0,006, t-value: 3,246) shows a remarkable relation, namely in those countries, where the financial structure is more market-based, the CAR is higher.

Does the question occur as of whether there is any correlation between the change of a bank's total asset and evolution of CAR? I investigated the tightness of this relationship between the mentioned variables in the following.



Sources: author's calculations. Worldbank: Financial Structure Database, Bankscope, Deutsche Bundesbank.

Fig. 2. Relationship between CAR and deposit money bank assets in EMU (1990-2001)

In cross-country (cross-sectional) analysis I applied average data of CAR (weighted by bank assets), financial structure index and deposit money bank assets between 1990 and 2001.

In regression analysis I pointed out that there is an inverse relation between CAR and deposit money bank asset. This result confirms an implicit fact that big banks have smaller CAR than small ones (here examining countries and apart from bank market concentration in individual countries). Or to be more precise their CAR is decreasing with an increase of their balance sheet total. At examination of deposit money bank assets, it is statable that the CAR is decreasing significantly with expansion of bank assets (R^2: 0,426, significance: 0,015, t-value: -2,736). Obviously the total bank credits are connected to the extent of credit risk and this is the main element of required capital (for market risk US banks hold only 2% of their total required BIS capital).

Conclusion

The results partly strengthen the findings of previous studies concerning the anticyclical behavior of capital buffer, however they also attain a new outcome.

Examining the period between 1997 and 2004 in EMU I found a negative correlation coefficient (with exception of Greece) between output gap and capital adequacy ratio in four countries where (Austria, Spain, Finland, The Netherlands) the correlation is significant.

I pointed out analyzing the period of 1990-2001 in EMU that there is a significant positive correlation between CAR and financial structure index. On one hand, this can come from the fact that in countries with market-based financial structure the arm's-length type deals dominate, while the bank-based financial structures are henceforward following less the market prices due to strong bank-customer connection of deals (relationship-based transactions). On the other hand, the composite of banking systems is different and in bank-based financial structure the proportion of those banks (cooperative banks, savings banks) is higher, which is able to smooth the business cycle due to their lending activity.

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