

Possible weaknesses of the solvency ratios of the Basel Accords

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Abstract— A strong, sturdy and stable banking system is a basic condition for how the engine of the economy of a country works, and thus to support sustainable economic growth. In theory, the Basel Accords I, II and III aim to achieve these characteristics of strength, endurance and stability for the financial system. However, in the light of the financial crisis of the past 20 years, there are doubts about the effectiveness that the Basel agreements had to support banks during financial storms over the years of its implementation.

Keywords— Stress test; Basel Accords; Solvency, leverage and assets financed by equity ratios; Spanish banks; Capital level 1; Risk weighted assets (RWA); Capital increase

I. Introduction

Banks, which have a sensitive role in the economic scenario of a country, are companies that should have the same rights and obligations as all others. But often this is not the case, because when they have problems, sometimes for poor management, they are helped –“rescued” – with taxpayers’ money. This often occurs in many parts of the world, including in our beloved Europe. Rescue situations could be avoided in many cases, if the capital of financial institutions was used to set up a foundation able to withstand the economic storms simultaneously with the requirements of creditors. However, in the current situation, even with the Basel Accords III, we have serious doubts as to whether the parameters applied to measure the solvency ratios are adequate.

This article is focused on the results of stress tests carried out on the Spanish banks in November 2014. And faced with the questionable “approved” result obtained, specifically related to the solvency ratio, a more reliable proposal is presented here as an alternative solution. It concerns the gradual increase of additional capital in a scenario over five years, from 2015 – 2019, aiming to provide a real solvency to face the economic and financial ups and downs that will occur in the future.

II. The Basel Accords

A brief summary of the three Basel Accords is presented below.

2.1. Basel Accord I

The first Basel Committee was held in 1975. At its creation it was attended by ten presidents of the central banks of the so-called Group of Ten, G 10¹.

¹ The G10 is the group of countries that participates in the General Arrangements to Borrow (GAB). The GAB was established in 1962 when the governments of eight member countries of the International Monetary Fund (IMF) Belgium, Canada, France, Italy, Japan, Netherlands, United Kingdom and the United States and the central banks of two others, Germany and Sweden, agreed to provide more resources to increase the amount of money available to the IMF loans to

Basel I set a minimum capital that banks must have on its *Risk Weighted Assets* (RWA). At that time, the solvency ratio required for banks was a capital to RWA \square 8%, to facilitate the absorption of losses from credit risk. The Basel I structure can be seen in Figure 1.

2.2. Basel Accord II

In 2004, the Committee published a revision of the Agreement of 1988 which established procedures for the calculation of the RWA. It also provided that banks should have the possibility to apply risk ratings based on their own models. This second agreement did not alter the basic elements of Basel I, such as (i) the solvency ratio, which remained at 8%, and (ii) the definition of capital, which did not change the aggregate level of the capital requirements. The calculation of the solvency ratio of Basel I set out in Figure 2.

It may be noted that Basel II does not change the numerator of the solvency ratio as defined in Basel I. What this event changed was the denominator in what it referred to as the calculation of risk weighted assets. Therefore, one of the aims of this new agreement was to adapt the level of the regulatory capital to the real situation of each bank. Later, it was found that there were huge differences of criteria in the interpretation and implementation of agreements by each bank. The main differences between Basel I and Basel II are summarized in Figure 3.

The rules of market risk are not modified, but the credit risk. It also introduced a new operational risk that had not been contemplated. Basel II represented a major challenge, both for banks and for their supervisors. For the banks, because, for the first time were allowed to use their own credit risk models and operate to determine the minimum regulatory capital they needed. For supervisors, because they were faced with a new operational framework, and therefore, unknown so far, compared to traditional monitoring practices. Basel II structure is shown in Figure 4.

The Basel II framework was based on three pillars and the relationship among them was one of the factors relevant to the agreement and involved a triple guarantee: (i) the definition of a more ambitious and complex regulation, (ii) supervisory review of this regulation, and (iii) verification of their implementation by the market.

It was expected that the structure of the three pillars would prevent any problems with the banks. However, the global financial crisis of 2007, though it began before the coming into force of Basel II, laid bare the weaknesses of the new agreement. Among these are included: (a) the “generous” definition of capital, (b) the deficiency of the requirements reflected in the excessive leverage in the financial system, (c) the shortage noticeable in securities and the definition of market risk, (d) little respect for the supervisory guidelines on good governance and risk management, and (e) the ineffectiveness of the

countries that were not members of the group, after fulfilling specific requirements incorporated by Basel II.

recommendations on the management of liquidity and no effective market discipline.

2.3. Basel Accord III

As Basel I and II were initiatives of the G10, Basel III was the response to the financial crisis and introduced the Financial Stability Board (FSB) as an institutional innovation². Another novelty was the inclusion of members of the G20³, because the financial crisis highlighted the need for the participation of other forums, as was the case with emerging countries. All these initiatives contributed to improve the legitimacy of the Committee as a forum for developing global prudent standards.

However, Basel III does not replace Basel II. That is, that the most important element of Basel II, the prudent and supervisory process, is not altered, nor the three-pillar structure. Basel III only changed some of its rules introducing new prudent tools. The new agreement grouped the following measures: (i) improve the quality of capital to absorb losses more adequately; (ii) reduce the risk of the capital framework; (iii) increase minimum capital levels, with an increment in the minimum common equity from 2% to 4.5% and the introduction of a conservation buffer and a countercyclical one; (iv) require a leverage ratio as a reinforcement to solvency, based on the risk, to contain excessive leverage in the banking system; (v) improve the standards supervisory process (Pillar II) and market discipline (Pillar III); (vi) create a ratio of short-term liquidity and net stable funding ratio for the long term.

But most important to highlight in our paper is that the main objective of Basel III is to increase and improve the capacity to absorb the consequences of the processes of financial stress, and thus reduce the risk of contagion from the financial sector to the whole economic system.

2.4. Have achieved their objectives Basel I, II and III?

In the light of the financial crisis of the past 20 years starting with Mexico in 1994 ("tequila effect"), to which began in the United States in mid-2007 as a result of the collapse of the financial bubble, there are doubts about the effectiveness that the Basel agreements had to support banks during financial storms over the years of its implementation. We observe in Figure 5.

Based on the foregoing, we consider it is urgent to present an alternative solution for financial institutions to face any future crisis with real solvency. In this sense, this article proposes a technically valid option. But it requires the willingness of bankers to undertake a pragmatic solution, and not use more convoluted formulas of financial engineering that lead to a merely virtual solvency.

III. Stress Test of November 2014 to Spanish banks

3.1. Objectives of the Stress Test

² Financial Stability Board (FSB), founded in April 2009 as a continuation of the Financial Stability Forum, brings together national authorities (central banks, supervisors and treasury departments), international financial institutions, international groups of regulators and supervisors and the European Central Bank. Its purpose is to promote international financial stability through information exchange and cooperation in financial supervision and surveillance.

³ In 2009, the Basel Committee doubled its size to include 27 institutions, represented by 44 officials from central banks and supervisory bodies.

The main objectives of the stress test were to: (i) evaluate the ability of the banking system to withstand adverse scenarios; that is, equity should be higher than the probable deterioration of the asset and simultaneously to respond to savers and investors; (ii) provide transparency to the market; (iii) to set up the additional capital required to ensure solvency in stressed scenarios.

In Europe 130 financial entities participated, of which 15 were Spanish: Banco Financiero y de Ahorros, Banco de Bilbao y Vizcaya Argentaria, Bankinter, Banco Mare Nostrum, Banco de Sabadell, Cajas Rurales Unidas Sociedad Cooperativa, Cataluña Banco, Caja de Ahorros y M.P. Zaragoza, Aragón y Rioja, Kutxabank, Caja de Ahorros y Pensiones de Barcelona, Liberbank, NCG Banco, Banco Popular Español, Banco Santander and Unicaja Banco. Except for Liberbank, they have approved all of the above conditions, from which therefore, a solid economic and financial situation of the Spanish banking system could be deduced. However, according to the financial statements as at December 31, 2011, Spanish banking was in deep trouble. And in less than three years, it would have to take an incredible change of 180 degrees. This, at least, was doubtful. Table 1 shows the consolidated financial statements of Spanish banks as at December 31, 2011.

We said above that "the Spanish banking was in deep trouble", because if it is estimated that the bad debt portfolio amounted to only 15% -125.007.649 thousands of Euros- this amount was negative in relation to the equity and it would have meant the collapse of the Spanish banking system. But even worse, it was considered likely that the so-called "toxic assets" –bad portfolio– represented a percentage higher than 15%.

Faced with this serious situation, the Government that took office at the end of 2011, announced on June 9, 2012 that it was obtaining a loan of 100,000,000 thousand Euros from the European Union to *rescue* the Spanish financial system. These funds were used primarily to *clean up* some savings entities. Of the 100,000,000 thousands, 40,000,000 thousands were used. And this amount, as always, will be paid by all taxpayers of the country.

3.2. Results of the stress tests

Table 2 presents a summary of the results of stress tests related to the solvency ratio. It is important to remember that the CET 1 is the central measure of the financial strength of a bank, whose formula is:

$$\text{CET 1} = \frac{\text{Capital level 1}}{\text{Risk Weighted Average}} \geq 8\% \quad (1)$$

In the numerator, about 23 economic and financial concepts are combined, while in the denominator, about 10⁴ interact. That is, the end result is the product of a dense and convoluted financial engineering. But, from our point of view, the basic problem is that the requirement of 8% would be insufficient, due to scarcity of a quantitative numerator of the formula.

While it is true that Basel II recommended no limit "to raise capital to the increased risks that banks face, but other measures were necessary, such as strengthening risk management, strengthening the level of provisions and reserves, and improving internal controls", it is clear that in view of everything that happened in the global financial system during the last financial crisis, these recommendations failed. So, why does it still require a percentage equal to or greater than 8%, if it

⁴ Source: Bank of Spain
<http://www.bde.es/f/webbde/GAP/Secciones/SalaPrensa/ComunicadosBCE/NotasInformativasBCE/14/Arc/Fic/plantilla.pdf>

has been insufficient to deal with the crisis? Are financial markets, customers, investors and creditors of a bank calmer if the solvency ratio is greater than 8%?

IV. Our alternative proposal

4.1. Solvency, Leverage and Assets financed by equity ratios

The formulas that indicate the solvency, leverage and assets financed by equity of Spanish banks, as well as their evolution from 2010 to 2014, are shown below:

$$4.1.1. \text{ Solvency} = \frac{\text{Equity}}{\text{Total Liability}} \quad (2)$$

$$4.1.2. \text{ Leverage} = \frac{\text{Total Liability}}{\text{Equity}} \quad (3)$$

$$4.1.3. \text{ Equity ratio} = \frac{\text{Equity}}{\text{Total assets}} \quad (4)$$

4.1.4. Comments

It is noted that, during the 14 years studied, there was a slight improvement of the three ratios. For example, in Figure 6, the solvency indicator has increased from 7.6% to 10.4%. However, the reality is that the equity of the banks has not set up a base that provides security to creditors during financial storms. Therefore, it seems clear that it is rather low; moreover, all the financial engineering presented serves only as a façade of the solvency of the entities and is designed to pass the stress test. Obviously, it is more comfortable, and cheaper, to devise and recommend formulas instead of integrating more equity.

4.1.5. Some sophistries of the Committee of Basel Banking Supervision (CBBS)

Since significant levels of the Basel Committee stated that the concept of regulatory capital in banking is different from the equity of other companies. Therefore, the CBBS, to define regulatory capital, adopted a different perspective. It noted that *"since the function of the equity is to ensure the stability of the entity even in very adverse scenarios, the question is whether banks can contribute or not to that aim... With this approach, the equity of the banks will be: capital and reserves; but also those accounts representing gains may not have registered in the reserves ... or certain liabilities that have a dilated (or perpetual) term, or the possibility of suspending repayments in certain circumstances, that permit holders to impose moratoriums on their rights ..."*

With the above criteria, what would happen if every company fits the criteria of sufficiency of its equity from a *"different perspective"*. It could be the start of an irreversible path towards breaching international accounting standards. Therefore, the above mentioned by the CBBS is a series of fallacies about the equity, which has fallen at the times when it really should have demonstrated its effectiveness and solvency.

4.2. Alternative proposal

Facing the above exposure, how much should be a sufficient equity? It is known that lending banks require the borrowers -in addition to other financial, technical, legal and environmental

requirements- specific indicators for the assets financed with equity. For instance, for factories, railway companies, etc., 50%; water service, energy, etc., 40%; commercial companies, airlines, etc., 30%; and service companies, 25%.

So, why do not banks increase their equity to, for example, 15% of their total assets? They could, say, integrate these funds gradually over five years. Herein is our proposal presented in Table 3 and the following observations provide clarifications about the fore mentioned table.

- Growth in total assets⁵ of 2.9%, 2.5%, 2.0%, 1.8% and 1.6%, for the years 2015, 2016, 2017, 2018 and 2019 respectively are estimated.
- The *"Capital Increase"* to be carried out gradual and annually by the banks, with its counterpart in the *"New assets"* account.
- The capital increases will improve the ratio from 10.6%, in 2015, to 15%, in 2019, a percentage that matches our alternative proposal.

In addition, and not the least important, this proposed capital increase would be a demonstration of reciprocity on the part of the Spanish banking system to the taxpayers, who will pay the 40,000,000 thousands Euros mentioned in section 2.1.

V. Conclusions

The summary of the capital increases is observed in the Table 4. Also in Figure 9, the gradual increase in the ratio of assets financed with equity from the current 9% to 15% would be achieved by the increases referred in 2019.

The implementation of our proposal depends on:

- The enactment of new recommendations by the Committee of Basel Banking Supervision.
- These guidelines, within the European Union framework, will involve the modification of Directive 2013/36/EU (CRD IV) and the EU Regulation N° 575/2013 (RRC) related to capital requirements.
- And finally, and perhaps most importantly and difficult, of the willingness and goodwill of bankers.

Regarding this last item (iii), it is important to mention that the Spanish banking market is an oligopoly dominated by two large institutions, Banco Bilbao y Vizcaya Argentaria (BBVA) and Banco Santander. Between them both, they must represent a total of 219,754,338 thousands Euros, i.e., 62.1% of all capital increases, 354,000,000 thousands Euros. And among the big five –BBVA, Santander, Sabadell, Popular and Bankinter– 310.274.347 thousands Euros, i.e., 87.6%.

In conclusion, the solvency of the Spanish banking system – which undoubtedly can be extrapolated to the European– in order to acquire strength, endurance and real stability to resist a future financial crisis, needs to strengthen the numerator of the formula of the solvency ratio -and thus the *"Tier 1"*- through gradual capital increases.

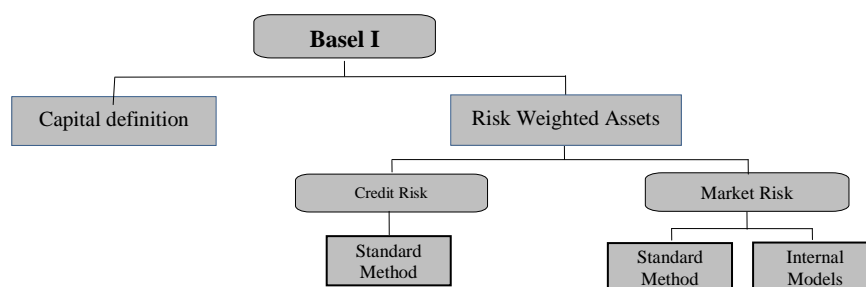
⁵ Source: Ministry of Economy and Competitiveness of Spain, 2015 and 2016. The growth rates for the years 2017, 2018 and 2019, were estimated by the authors based on likely changes that could occur in the Spanish political scene, from December 2015.

Abbreviations and Acronyms

AQR = Assets Quality Review
 BIS = Bank for International Settlements
 CBBS = Committee of Basel Banking Supervision
 CET 1 = Common Equity Tier 1
 EBA = European Banking Association
 FSB = Financial Stability Board
 GDP = Gross domestic product
 RWA = Risk Weighted Average

Figures

Fig. 1
Basel I Structure



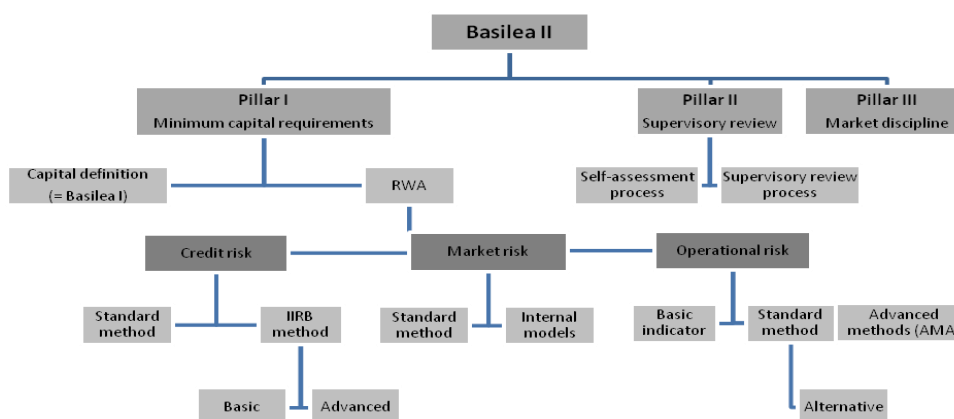
Source: Millán de la L., J.R. y Fruet-C., J.V. 2012. Supervisión bancaria internacional. Una doble visión BIS y EBA.

Fig. 2
Solvency ratio of Basel I



Source: Millán de la L., J.R. y Fruet-C., J.V. 2012. Supervisión bancaria internacional. Una doble visión BIS y EBA.

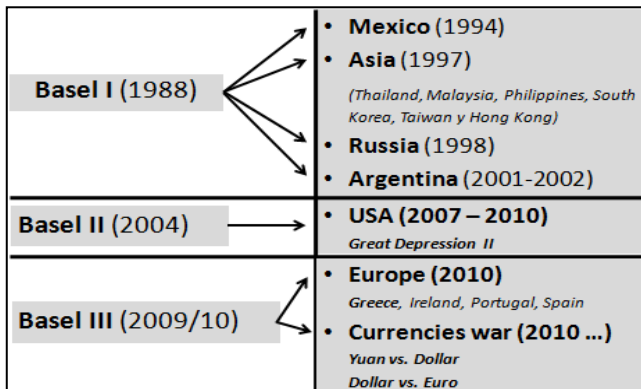
Fig. 3
Basel II Structure



Source: Millán de la L., J.R. y Fruet-Cardozo, J.V. 2012. Supervisión bancaria internacional. Una doble visión BIS y EBA.

⁶ Incorporated by Basel II.

Fig. 4
Basel I, II and III vs. Financial crisis



Source: Prepared by the authors

Fig. 8
Gradually increasing the Equity ratio

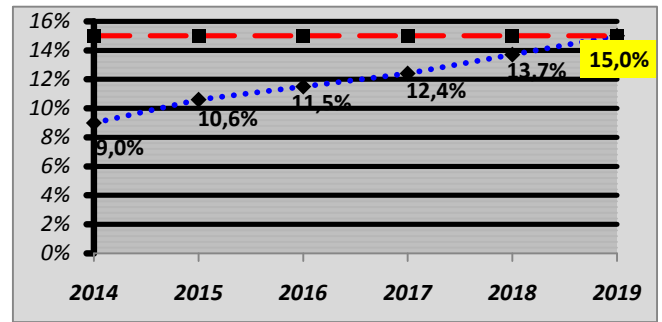


Fig. 5
Solvency ratio of Spanish Banks – 2000 to 2014

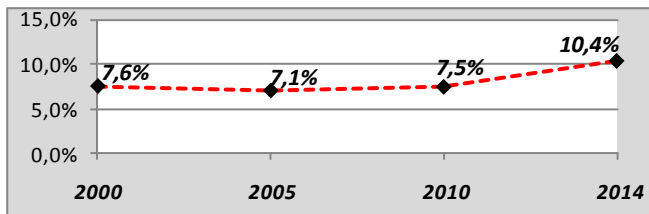


Fig. 6
Leverage ratio of Spanish banks – 2000 to 2014

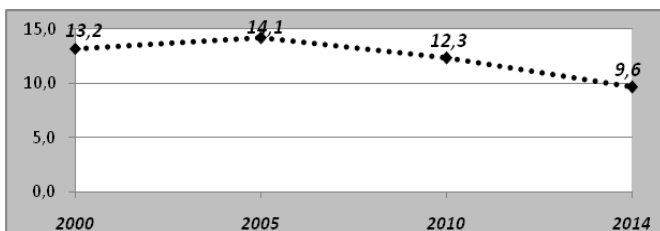
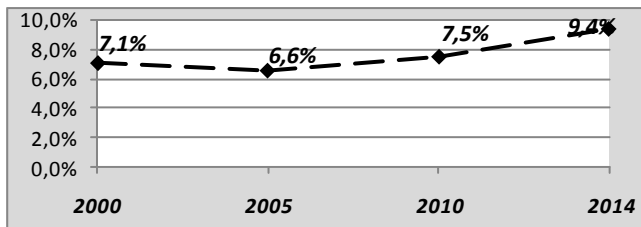


Fig. 7
Equity ratio



Source: Graphs prepared by the authors on the basis of the financial statements of Spanish banks (2000-2014), published by the Bank of Spain.

Tables

TABLE 1
Comparative scheme between Basel I and II

	Basel I	Basel II
Minimum capital ratio	8%	
Capital definition	Tier 1 ⁷ + Tier 2 ⁸	
Market risk	Amendment 1996	
Denominator of the ratio	Weighted assets based on broad categories of credit	For credit risk, assets are weighted based on: a. External ratings agencies as much risk category. b. Internal models of institutions.
Change		Operational risk in the denominator
Change		Banking supervisory process (Pillar I).
Change		Market discipline (Pillar II).

Source: Millán de la L., J.R. y Fruct-C., J.V. 2012. Supervisión bancaria internacional. Una doble visión BIS y EBA.

TABLE 2
Consolidated financial statements of Spanish banks at December 31, 2011 (Thousands of €)

Portfolio	833.384.328	Equity	119.420.927
Other Assets	695.043.930	Liabilities	1.409.007.331
Total Assets	1.528.428.258	Equity & Liabilities	1.528.428.258

Source: Table prepared by the authors on the basis of data from the Bank of Spain

⁷ Tier 1 or *Core Capital*, measures the strength of the bank. It includes issues of equity and reserves for loan losses. They may also be included perpetual preferred shares and other investments.

⁸ Tier 2 or *Supplementary Capital*, considers all the increase in investment assets, long-term debt with a maturity of over five years and the "hidden reserves" (excess compensation for losses on loans and leases).

TABLE 3
Results of the stress test of Spanish financial entities – Numbers in percentages (%)

Financial entity Ratio	Bco. Financiero	BBVA	Bankinter
CET1 adjusted by AQR ⁹	10,60	10,54	11,67
CET1 adjusted base scen. ¹⁰	12,33	10,24	11,63
CET1 adjusted adv. scen. ¹¹	10,30	8,97	10,80

Financial entity Ratio	BMN	Banco Sabadell	Cajas Rurales Unidas
CET1 adjusted by AQR	9,01	10,26	9,95
CET1 adjusted base scen.	10,30	10,16	10,17
CET1 adjusted adv. scen.	8,09	8,33	7,99

Financial entity Ratio	Cataluña Banco	Caja Zaragoza	Kutxa-bank
CET1 adjusted by AQR	12,21	10,01	12,03
CET1 adjusted base scen.	11,76	10,31	12,36
CET1 adjusted adv. scen.	8,02	7,82	11,82

Financial entity Ratio	Caja de Barcelona	Liberbank	NCG Bank
CET1 adjusted by AQR	10,24	7,82 ¹²	10,18
CET1 adjusted base scen.	10,79	8,51	11,50
CET1 adjusted adv. scen.	9,25	5,62	9,14

Financial entity Ratio	Banco Popular	Banco Santander	Unicaja Banco
CET1 adjusted by AQR	10,08	10,34	10,88
CET1 adjusted base scen.	10,20	11,05	11,12
CET1 adjusted adv. scen.	7,56	8,95	8,89

⁹ Common Equity Tier of level 1 (CET1) adjusted by the *Assets Quality Review* (AQR).

¹⁰ The base scenario means a "normal" situation for Spain. The parameters are: (i) GDP, an increase of 1% for 2014, 1.7% for 2015 and 2.2% for 2016 was expected. (ii) Unemployment rate: 25.7% for 2014; 24.6%, 2015 y 23.2% for 2016. (iii) Inflation rate, 0.3% for 2014, 0.9%, in 2015 and 1.3% in 2016. House prices: a decrease of 8.7% in 2014 and 14% in 2015 and 2016.

¹¹ An adverse scenario would be: (i) GDP, a contraction of 0.3% in 2014, 1% in 2015 and a small 0.1% growth in 2016. (ii) Unemployment rate, up to 26.3% in 2014, 26.8% in 2015 and 27.1% in 2016. (iii) Inflation rate, would remain at very low levels, 0.3% in 2014, 0.4% in 2015 and 0.8% in 2016. Housing prices, a light reduction of 3.1% in 2014 and 5% in 2015 and 2016. (v) Interest rate of treasury bonds 10-years would rise again to 5.7%. (In August 2012 reached 7.2% in the secondary market).

¹² Liberbank was the only failed entity, because its mark was less than 8%.

TABLE 4
Estimated consolidated balance sheets of Spanish banks
December 2015 to December 2019

FINANCIAL STATEMENTS - December 31, 2014					
	Thousands €	%		Thousands €	%
Portfolio	732.552.419	50,5%	Equity	136.301.019	9,4%
Other Assets	718.283.650	49,5%	Capital Increase	0	0,0%
New Assets			Total Equity	136.301.019	9,4%
			Liability	1.314.535.050	90,6%
Total Assets	1.450.836.069	100,0%	Total Equity & Liability	1.450.836.069	100,0%

Source: Prepared by the authors on the basis of data from the Bank of Spain

FINANCIAL STATEMENTS - December 31, 2015					
	Thousands €	%		Thousands €	%
Portfolio	753.796.439	49,7%	Equity	136.301.019	9,0%
Other Assets	739.113.876	48,7%	Capital Increase	25.000.000	1,6%
New Assets	25.000.000	1,6%	Total Equity	161.301.019	10,6%
			Liability	1.356.609.296	89,4%
Total Assets	1.517.910.315	100,0%	Total Equity & Liability	1.517.910.315	100,0%

FINANCIAL STATEMENTS - December 31, 2016					
	Thousands €	%		Thousands €	%
Portfolio	772.641.350	49,1%	Equity	136.301.019	8,7%
Other Assets	757.591.723	48,1%	Capital Increase	44.000.000	2,8%
New Assets	44.000.000	2,8%	Total Equity	180.301.019	11,5%
			Liability	1.393.932.054	88,5%
Total Assets	1.574.233.073	100,0%	Total Equity & Liability	1.574.233.073	100,0%

FINANCIAL STATEMENTS - December 31, 2017					
	Thousands €	%		Thousands €	%
Portfolio	788.094.177	48,5%	Equity	136.301.019	8,4%
Other Assets	772.743.557	47,5%	Capital Increase	65.000.000	4,0%
New Assets	65.000.000	4,0%	Total Equity	201.301.019	12,4%
			Liability	1.424.536.715	87,6%
Total Assets	1.625.837.734	100,0%	Total Equity & Liability	1.625.837.734	100,0%

FINANCIAL STATEMENTS - December 31, 2018					
	Thousands €	%		Thousands €	%
Portfolio	802.279.872	47,6%	Equity	136.301.019	8,1%
Other Assets	786.652.941	46,7%	Capital Increase	95.000.000	5,6%
New Assets	95.000.000	5,6%	Total Equity	231.301.019	13,7%
			Liability	1.452.631.795	86,3%
Total Assets	1.683.932.814	100,0%	Total Equity & Liability	1.683.932.814	100,0%

FINANCIAL STATEMENTS - December 31, 2019					
	Thousands €	%		Thousands €	%
Portfolio	815.116.350	46,9%	Equity	136.301.019	7,8%
Other Assets	799.239.388	46,0%	Capital Increase	125.000.000	7,2%
New Assets	125.000.000	7,2%	Total Equity	261.301.019	15,0%
			Liability	1.478.054.720	85,0%
Total Assets	1.739.355.739	100,0%	Total Equity & Liability	1.739.355.739	100,0%

TABLE 5
Total of proposed capital increases –2015 to 2019

Years	Growth rates (%)	Capital increases (Thousands €)
2015	2.90	25,000,000
2016	2.50	44,000,000
2017	2.00	65,000,000
2018	1.80	95,000,000
2019	1.60	125,000,000
Total		354,000,000

Source: Prepared by the authors. The growth rates for the years 2015 and 2016 are based on the Ministry of Economy and Competitiveness of Spain. For years 2017, 2018 and 2019, they were estimated by the authors based on likely changes that could occur in the Spanish political scene, from December 2015 onwards.

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