"la Caixa" economic papers

No. 07 DECEMBER 2011

Capital requirements under Basel III and their impact on the banking industry

Jordi Gual

"la Caixa"

RESEARCH DEPARTAMENT

”la Caixa”

Research Department
Av. Diagonal, 629, torre I, planta 6
08028 BARCELONA
Tel. 93 404 76 82
Telefax 93 404 68 92
www.laCaixa.es/research
e-mail: publicacionesestudios@lacaixa.es

"la Caixa" ECONOMIC PAPERS

No. 07 DECEMBER 2011

Capital requirements under Basel III and their impact on the banking industry*

Jordi Gual[1]

Abstract

This paper reviews the theoretical and empirical arguments behind the increase in capital requirements proposed by the Basel III regulations. The detailed analysis of both theory and evidence casts doubts on the beneficial effects of Basel III. It is shown that the new regulations are unlikely to diminish risk taking in the banking industry and that the increased capital requirements most likely will lead to increased costs of funding for the industry with adverse consequences for the real economy.

JEL Codes: G21, G28, G32
Keywords: banking regulation, banking risk, cost of financing

* This paper has been published in Spanish in *Papeles de Economía Española*, n. 130, 2011.
1. Chief Economist at "la Caixa" and Professor at IESE Business School. I am grateful to Santiago Carbó, Avelino Hernández, Enric Fernández, Sandra Jódar-Rosell, Matthias Bulach and Oriol Aspachs-Bracons for their observations.

TABLE OF CONTENTS

1. Introduction

Basel III is an initiative for internationally coordinated regulatory change that is designed to offer a response to some of the inadequacies of the regulatory framework as it stood before the financial crisis of 2007-2011.

The new regulations cover a range of areas. However, this brief analysis will focus on capital requirements and will not go into equally important issues such as countercyclical capital buffers, liquidity requirements or macroprudential approaches.

The Basel III philosophy as regards capital requirements is clear: the aim is to maintain the spirit of Basel II, requiring more capital for the banking activities that entail greater risk, while at the same time increasing the requirements in pursuit of two objectives:

- To ensure that institutions possess higher levels of equity in order to be able to deal with potential losses;

- To ensure that institutions operate at lower risk levels. In other words, to ensure that the demand for higher levels of equity per unit of risk carries with it a greater exposure to losses by the actual owners of the capital, thus creating a disincentive for taking excessive risks.

My aim in this paper is to examine two issues which are key to making an *ex ante* assessment of the suitability of the new regulations. In the first place, to what extent can we expect, on the basis of a economic analysis and an examination of the empirical evidence, that higher capital requirements will lead banking institutions to take on less risk? Secondly, how will this affect the cost of financing the banks? Both of these questions are crucial if we are to determine whether the new regulations will reduce the probability of further financial crises and, in the event that they do, whether the costs incurred will be affordable.

2. What is the relationship between capital ratios and risk taking?

What is really important as regards the new capital requirements is not that they increase the equity cushion that allows an institution to cover its losses, but rather the effect that this increase in the capital ratio may have on the incentive[2] to take on risk. The creation of larger cushions would be of little use if institutions just took on even greater risks that could equally lead them to insolvency in the event that the risk materialised.

It is firstly important to stress that if the measurement of risk by the regulatory authority were perfect, an increase in the capital ratio would not, by definition, entail greater risk, since as soon as it was detected by the regulator it would result in a higher capital requirement. Indeed, it is useful to break down the regulatory capital ratio, E/RWA (in which (E) = equity and (RWA) = risk-weighted assets), into its two individual components: equity in relation to total assets (E/TA) and the (RWA/TA) ratio, which measures the level of risk attached to the institution's total assets. Thus, (E/RWA) = (E/TA)/(RWA/TA). Under perfect regulatory conditions, an increase in risk uptake, i.e. an increase in (RWA/TA), should be matched by an increase in the non-weighted capital ratio (E/TA), or a decrease in leverage (TA/E), which amounts to the same thing.

The events of recent years offer clear evidence of the effectiveness of risk-measuring methods. It is very difficult in practice for the regulator to check the risk that has actually been taken on by an institution. As pointed out in Haldane (2011, page 6, figure 5), the latest expansion cycle showed that the actual risk borne by institutions was far from properly reflected in the way that regulators calculated risk-weighted assets. The problem is even more serious for institutions that use the Basel II advanced method to calculate capital requirements. This method, based on models developed by the banks themselves and supervised by the regulator, has led to marked disparities in risk-weighted assets between banks with similar business models, thus underlining the potential for divergence between the risk actually taken on and the risk reported under the regulations[3].

Having made this important caveat, it now remains to examine the relationship between the non-weighted capital ratio and the assumption of risk. In other words, are there reasons to believe, from a theoretical point of view, that a greater proportion of equity in an institution's financing structure will bring a lower assumption of risk? In principle it would seem intuitive that in proportionally bringing more equity into play, the risk assumed would tend to fall. However, this is a theoretical view that is only valid under certain quite restrictive circumstances.

There are several reasons why, at a theoretical level, an increase in the capital ratio[4] will not necessarily result in less risk.

First, it is possible that banks will attempt to offset the increased cost of equity resulting from greater solvency requirements (see section 3 of this paper) by assuming greater risk in order

2. In a more detailed analysis it would be necessary to distinguish between the incentives for managers, the incentives for owners and the incentives for debtholders. For the sake of simplicity, we shall here assume that the owners are the financial institution's managers.
3. See, for example, Bank of England (2011), page 30.
4. From this point on, any references to the capital ratio will therefore refer to the non-weighted ratio or, to put it another way, the opposite of the leverage ratio.

to maintain the return on their equity. The theoretical arguments that lead to this position are many.

a) Based on the mean-variance portfolio selection model, the literature shows that the inverse relationship between the capital ratio and the assumption of risk is valid if there is no limited liability and, furthermore, there is perfect regulation of capital ratios, in the sense that the weighting applied to capital requirements coincides exactly with the beta parameters that define the individual risk involved in each of the different assets in the portfolio. If these conditions are not met, it could easily happen that an increase in capital ratios will result in the assumption of greater risk by financial institutions (Koehn and Santomero (1980) and Kim and Santomero (1988)). The intuition is simple: given an increase in ratios, institutions will attempt to increase their returns on equity in order to take advantage of their limited liability in the face of adverse events, and they can do so to the extent that, as already mentioned, the regulatory ratio does not truly reflect the risk actually taken on by an institution.

b) Flannery (1989) shows how financial institutions minimise the individual risk to their assets in order to satisfy capital restrictions, while at the same time maximising risk to the portfolio as a whole, with the aim of taking maximum advantage of the value of the financial option afforded to banks by the existence of deposit insurance.

c) Blum (1999) and Hellman, Murdock and Stiglitz (2000) stress that despite the fact that capital requirements reduce the incentive to take on risk as they bring more equity into play, this effect can be more than counteracted if one considers the dynamic impact of regulations. First, in reducing the expected return to the banking business, one reduces the value of the franchise, which means that the cost of taking on additional risk decreases. Secondly, capital regulations increase the value of future equity. If access to the capital markets is excessively costly (which will very probably happen in the short term, see section 3 of this paper), the banks will have an incentive to generate capital internally by increasing current risk (Blum, 1999).

One finds a further theoretical argument if one dispenses with the usual assumption that risk is distributed normally. To be specific, Perotti, Ratnovski and Vlahu (2011) show that with limited liability and fat-tailed risk distribution, there is no reason why the imposition of additional capital requirements should change the uptake of risk, since incremental changes to capital cushions will not alter incentives, given that the magnitude of any of losses in the event of bankruptcy will be such that it will be almost impossible for them to be covered whatever the regulatory capital requirements. Indeed, they demonstrate that in the presence of tail risk, the imposition of higher capital ratios changes the levels of risk chosen by banks and can lead to the adoption of positions of even greater risk.

Finally, given that it dilutes the shareholders and reduces the franchise value, an increase in capitalisation could reduce any incentive to engage in the proper level of risk monitoring, and the quality of assets could therefore fall (Boot and Greenbaum (1993)).

This quick overview of the academic literature demonstrates that the analytical bases for anticipating that an increase in capital requirements will result in reduced risk are, at the very least, debatable.

Given that the theory provides predictions that are ambiguous, all that remains is to make an empirical examination, based on historical experience, of the past relationship between these two variables: capital ratio and risk actually assumed.

One can first approach this problem using the aggregate time series data and examine whether, during periods of lower capital ratios, greater risk has been taken on, and to what extent any potential correlation is due to a causal relationship between the two variables.

The long-term evidence provided by Berger *et al.* (1995) and Kashyap *et al.* (2010) for the United States shows that capital ratios at banking institutions fell up to the 1940s as systems were developed that explicitly and implicitly were guaranteeing the liabilities of banks. Since 1940, capital ratios have varied within a range of 5 to 12%, with a specific period of continuous growth precisely between 1990 and 2009. In other words, an increase in capital ratios preceded the greatest financial crisis since the Great Depression. To put it another way, the increases in ratios that resulted from regulatory pressure did not prevent the assumption of greater risks, risks that were frequently off balance sheet or not detected by regulatory controls.

One can, in principle, obtain a more robust empirical evaluation by using individual panel data and try to factor in all the other elements apart from capital ratios that also affect institutions when it comes to taking on risk.

This empirical approach is difficult to implement in practice. Using a panel database, Kashyap *et al.* (2010) show that there is a positive correlation between leverage and individual risk at institutions. However, their work involves estimates using a reduced form model in which it is not possible to determine the sense of causality. As the authors themselves acknowledge, it could well be that banks with different risk profiles choose different financing structures , so what the data show is not necessarily that a lower level of capitalisation means greater risk, but that banks with lower risk portfolios choose to be better capitalised.

Miles *et al.* (2011) also attempt to assess the relationship between the risk assumed by banking institutions and their levels of leverage on the basis of a simple regression in which the dependent variable is the individual risk (beta) of an institution and the independent variable is its level of leverage represented by the ratio of Total Assets over Tier 1 Capital. The authors obtain a positive coefficient. However, this assessment is subject to two important qualifications, in addition to the simultaneity problem already mentioned[5]. Firstly, the specification excludes debt as an explanatory variable, which is unquestionably important since the authors obtain a positive coefficient and also an intercept parameter other than zero, which reveals a possible specification error. In any case, the effect of a non-null intercept reduces the impact of leverage since an increase in this variable has a proportionally lower effect on risk[6].

5. The specification used relies on the decomposition of the risk attached to assets A into what is supported by equity E and what is supported by debt D. Thus: $\beta_A = \beta_E(E/(D+E)) + \beta_D(D/D+E))$, where β_E and β_D are respectively risk supported by equity and risk supported by debt. Isolating β_E and assuming that β_D does not differ between institutions, one obtains the estimated regression: $\beta_E = \beta_A ((D+E)/E)$ in which ((D+E)/E) measures leverage. This specification means that the intercept $(- (D/E)\beta_D)$ will be zero under the null hypothesis.

6. The authors assume, therefore, that the risk supported by equity depends only on the risk attached to assets and on leverage, and not on the risk that could be supported by debt. If there are differences between institutions as regards risk supported by debt, it would mean we are excluding an important factor. This would affect the quality of our assessment of the parameter that measures the effects of leverage, over-estimating it if some of the increases in leverage are also supported by debt and not only by equity.

In addition, the dependent variable is estimated using market data, and if significant errors of measurement are present this could lead to biased estimates of the parameters. Indeed, in the case concerning us here, the evidence shows that during periods of boom and increased leverage, risk has been underestimated by the markets. This negative correlation between the unobserved part of the dependent variable and the independent variable means that the parameter being studied tends to be overestimated, which would raise doubts about the results obtained by Miles *et al.* and the significant positive relationship that they find between leverage and risk.

On the other hand there are empirical studies that have examined this question and reached the opposite conclusion. Hovakimian and Kane (2000) find a negative correlation between leverage and risk in a sample of North American banks for the periods between 1985 and 1986 and 1992 and 1994, though they report a positive relationship for the period from 1987 to 1991. For their part, Bichsel and Blum (2004) establish a positive relationship between capital ratios and risk assumed, in an econometric model that takes into account the fact that capital ratios and risk at banks are determined simultaneously.

In short, we can conclude that it is not clear, either from a theoretical or an empirical point of view, that an increase in the regulatory capital ratio will reduce the level of risk assumed by the financial sector. This is not surprising, given that Basel III continues the philosophy of Basel II (especially as regards the calculation and the role played by risk-weighted assets), and not only did Basel II fail to prevent the financial crisis of 2007 to 2011, it could also be argued to have contributed to it (Gual (2009) and Rochet (2010)).

This conclusion is important for two reasons. First, the beneficial effects of Basel III as regards the lower probability that risks will materializa have been one of the basic assumptions in all macroeconomic models that have measured the costs and benefits of Basel III (see, for example, BCBS (2010)). And second, this is therefore an assumption that one cannot legitimately make when examining the relationship between increased bank capital ratios and their financing costs. I shall now address this issue.

3. Are increased capital ratios going to mean greater financing costs for the banks?

The Basel Committee's answer to this question is "no", at least in the long term, and "not much" in the short term.

The theoretical basis for such a categorical response is one of the most famous theorems in economics and finance, the Modigliani-Miller theorem, which states that, under certain circumstances, the cost of financing a company[7] is independent of its financing structure in terms of capital and debt.

Is this theorem a reasonable approximation enough to the real world sp that it can be used as a guide for regulatory policy? I don't believe it is, for two basic reasons.

First, because for the theorem to apply, at a higher capital ratio it should be perceived by those supplying the finance that a lower level of risk is borne, something which, as I observed in the previous section, does not necessarily happen, either from a theoretical or from an empirical point of view. And secondly, because in addition to this first point, some of the theorem's other key assumptions are not met in practice, particularly where banking is concerned. I shall here examine these assumptions and if they do not hold what are the implications for the relationship between the capital ratio and financing costs in the banking sector. Following this, as in the preceding section of this paper, I shall examine the empirical relationship between the two variables.

The neutrality of financing structure in relation to its cost is only valid under certain circumstances, some of which I would like to stress as being especially important when it comes to applying the theorem to the banking industry:

a) The first is the absence of taxes. This is particularly important in a sector which, by definition, creates leverage using the debt that it enjoys from fiscal benefits. For some economists, such as Stein (2010), this argument, while true, has very little impact on financing costs, even if the increase in the capital ratio is highly significant. The reason is simple. Using the standard model for weighted average cost of capital (WACC), it is easy to see that each percentage point increase in the capital ratio raises financing costs on the basis of the applicable tax rate and the cost of the debt. If these are respectively 35% and 5%, for example, a one per cent increase in the capital ratio will increase the financing cost by 1.75 base points, so if the increase is from 3.3% to 6.6% (and leverage is therefore reduced from 30 to 15), this will mean an increase of only 5.8 basis points in the WACC. This figure would not appear to be very significant. However, it is of an order of magnitude similar to the impact on WACC costs that some authors attribute to the Modigliani-Miller effect, under which when the capital ratio rises, the cost of capital falls due to the decreased risk, thus reducing the adverse effect on the WACC that results from the increased ratio[8].

7. Financing cost is understood to mean the average weighted cost of capital. In other words, the weighted average between equity costs and borrowing costs.

8. Miles *et al.* (2011) believe that a fall in leverage from 30 to 15, rather than causing an increase of 33 basis points in the WACC will only cause a rise of 18 basis points, thanks to the fact that the lower level of leverage will reduce the equity cost (in their model, from 14.85% to 12.56%). The Modigliani-Miller effect is therefore 15 basis points. However, the extent of this effect depends directly on the parameter (β_A = 0,03 in the

b) The second element that casts doubt on the usefulness of this theorem is the absence of bankruptcy costs (Stiglitz (1969, 1972)). Indeed, in the banking literature, the existence of bankruptcy costs or, in a broader sense, financial distress costs, is one of the classic justifications for the optimisation of financial structure[9]. Institutions would prefer to be financed with debt because of the tax advantages that this offers (and even more so when there is implicit insurance of their liabilities), but this is offset in part by the costs incurred in adverse circumstances, when a bank is bankrupt or at risk of bankruptcy. Given that a large portion of these costs falls on the shareholders, this justifies increasing the proportion of capital in the institution's financial structure despite the greater cost of this in relation to debt (see, for example, Berger *et al*. 1995).

c) A third key element of the Modigliani-Miller theorem is that the private investor can replicate a company's financial structure, since he or she has the same opportunities for access to the capital markets as the company. It is not clear that this applies in banking, since a banking licence allows a financial institution access to direct financing from the central bank which is not available to private investors (Mink (2011)). The magnitude of this effect, however, is difficult to evaluate. Stein (2010) argues that if capital requirements influence the availability of short-term liquid debt for banks, then renouncing this kind of liability could involve an additional cost of one further basis point for each percentage point rise in the capital ratio.

d) Finally, the fourth and probably the most important weakness of the theorem is that it provides a theoretical result that ignores the problems of asymmetrical information which are ever present in the relationship between a business and its external suppliers of finance (see Gual 2009, section 2.2). Given the differences in the information on the quality of a company's projects available to the company's managers/owners[10] on the one hand and its external finance suppliers on the other, the financial structure between equity and debt is a key element that external finance suppliers will attempt to use in order to alter the managers' behaviour. In short, the value of a banking institution is not unaffected by its financial structure, since this structure modifies the way the institution behaves; it affects the incentives driving the managers and the way the institution is controlled in different circumstances (see Dewatripont and Tirole (1993). Where incomplete contracts exist, the Modigliani-Miller theorem therefore ceases to be valid. In general terms, the existence of parties that are holding debt and that take control when the institution finds itself in adverse situations should act as an element that introduces discipline into the actions of the managers/owners. In the case of banking, given the wide dispersal of their depositors and the existence of implicit guarantees on many of their liabilities, it is not the holders of debt but the regulator that will take control in the case of poorperformance. Indeed, incomplete contracts provide justification for the introduction of solvency requirements. In any case, although the

reference in note 5) estimated by the authors. We have already observed that this estimate is probably biased on the high side and not very precisely estimated. If the parameter were, for example, 0.01, the Modigliani-Miller effect would be similar in magnitude to the effect of any taxes in the opposite direction.

9. Note that this argument is even valid if an increase in the capital ratio leads to the taking up of less risk. It is therefore different from the argument raised in section 2 with regard to the existence or non-existence of limited liability.

10. Problems of asymmetrical information also naturally affect the relationship between the managers and the owners, though for the purposes of brevity we shall not enter into this question here. If management pay is linked, for example, to the company's list price, the financing structure may also be relevant (Jensen and Meckling (1976)).

theory of incomplete markets explains the existence of an optimum equity to debt ratio, it does not offer any clear guidelines as regards the impact in cost terms of external financing as opposed to equity.

The combination of all these factors would lead one to think that, even in the long term or in a steady state situation, an increase in capital requirements has an appreciable effect in terms of increasing the cost of financing a banking institution.

However, it is in the short term or during a period of transition when obtaining new equity on the capital markets can prove particularly costly, given that these markets are not very flexible or efficient. In particular, in addition to capital shortages, there could be problems of asymmetrical information (adverse selection) that make obtaining funds more difficult or expensive. Myers and Majluff (1984) show that it is cheaper for both companies and banks to turn first to the collateralised debt markets, then to the senior debt markets, and finally to the stock markets, since these display increasing degrees of information sensitivity, meaning that investors require a greater return on those securities that are more difficult to value (see Bolton 2011, page 8). This *pecking order theory* of a business's financial structure is also an alternative to the Modigliani-Miller model in the long term, but it is especially relevant at the moment when a business is forced to turn to the markets to raise new capital when it has experienced a negative shock to its equity or the value of its collateral.

Finally, what is the relationship, in empirical terms, between an increase in the capital ratio and the cost of financing of a banking institution[11]?

As regards the cost ofequity, which is the central point of interest here, it should be mentioned that this is a variable that cannot be directly observed on the markets. It can be defined as the return that is expected by investors who provide an institution with equity. That is, ordinary shares which allow for the absorption of losses without any kind of ambiguity.

According to both the economic and financial textbooks and banking practice, there are three ways of measuring the cost of equity (see King (2009)). The first is retrospective, based on past returns in the sector or the institution in question. That is to say, based on the historical return on equity (with some technical corrections regarding accountancy practices[12]). The second, this time prospective, uses the inverse of the PER ratio, calculated on the basis of the profits expected by analysts. The third and final method is to use past market data (not book data and, therefore, to a certain extent prospective data) to estimate a model for the valuation of banking business, such as the CAPM, which takes account of the evolution and correlation of banking shares as compared with the stock market index.

As King (*op.cit.*) shows, this third method, though it has its shortcomings, is the one that presents the least problems, and it is the one that is used by the Federal Reserve when calculating the cost of bank equity in the US. The calculations that King makes for the main developed countries using this method show that, in practice, the cost of an institution's equity depends, in the first place, on the risk perceived by the markets (measured, for example, by

11. The argument set out here coincides, in part, with Gual (2011).
12. In reality, attempting to alleviate the retrospective nature of this ratio through the use of stock market capitalisation in the denominator, rather than book value.

the CDS) and not on actual risk (associated with the intrinsic risk attached to assets). And in the second place it depends, to a great extent, on the markets' perception of the degree to which an institution could obtain public support in the event of any risk of bankruptcy.

As regards the cost of debt, it would also seem that the inverse relationship between financing costs and equity ratios does not entirely apply. For example, the Bank of England (2009) recently examined this question using a simple exercise in which it compared capital ratios at British banking institutions with the premium on risk demanded by those investing in debt, measured by the corresponding credit default swaps. The English central bank itself acknowledged that the absence of a simple correlation was probably due to the existence of the implicit insurance offered by the state. To this we must surely add that, as well as the capital ratio and public insurance, there are many different factors that influence the way that investors perceive risk, such as liquidity conditions, the nature of the assets involved, etc. Thus, any calculation of the effect of the capital ratio must in all cases control for all these other factors, though in view of the low levels of simple correlation it would be difficult for this effect to be empirically relevant.

In short, the empirical evidence would not appear to support the idea that an increase in capital ratios will lead to lower financial costs for banks. These empirical results, on the other hand, are in line with the weak theoretical bases that cast doubt on the usefulness of the M-M theorem in practice.

Based on a review of the evidence and economic theory, it is probable, therefore, that following an increase in capital requirements, the cost of financing institutions will rise moderately over the long term, though this rise will be more substantial in the short term or during an accelerated transition period.

4. Conclusions

Throughout this article I have attempted to examine the theoretical and empirical arguments that might justify the establishment of higher capital ratios for financial institutions under Basel III.

The evidence shows that such arguments are weak, especially if instead of comparing the different capital ratios in "steady state" one only examines the short term and the adjustment to ratios following these regulatory changes.

The provisions of Basel III include an acknowledgement of the potentially adverse effects of an accelerated process of increased capitalisation, and long transitional periods are suggested. Unfortunately, this gradual introduction of the requirements is not feasible in practice, since both the capital markets and the regulatory authorities themselves are bringing forward their implementation.

The expectation, therefore, is that the new capital regulations set out in Basel III and anticipated in practice by all the parties operating on the European banking sector could have significant effects on the markets as regards both the cost of financing and the availability of credit. The accelerated recapitalisation required by the organised markets and by regulators (in Spain, under the Royal Decree of February 2011, and in Europe as a result of the sovereign debt crisis, European Council decisions of October 2011) could result in high economic and social costs in the face of a limited supply of capital in the short term, and because the speed and circumstances of the process, the context of high levels of aversion to risk and serious problems in valuing asset quality are exacerbating the problems of asymmetrical information already referred to in this paper.

In addition, as I have also attempted to show, the regulatory approach adopted by Basel III places excessive emphasis on an increase in the capital ratio, without addressing the main problem of bank financing, which is the explicit and implicit underwriting of banking debt, and the fact that, in practice, many bank liabilities do not act as potential buffers for the absorption of losses. The proper hierarchical ordering of bank liabilities and the elimination of implicit guarantees would probably constitute a more efficient regulatory way of reducing an institution's incentives for leveraging itself, while at the same time increasing the funds available to cover losses in the event that risk materialises. In short, a more efficient way of trying to achieve the aims of Basel III, which should simply be to reduce the amount of risk borne by the system at the lowest possible cost.

By way of conclusion, it is interesting to note that the Modigliani-Miller theorem is one of the five neutralities in modern macroeconomics assessed by George Akerlof in his Presidential Address to the American Economic Association in 2007. Akerlof (2005) questioned the relevance of the theorem in relation to its implications for the macroeconomic investment function, debating the validity in terms of economic policy of a theoretical result that would only apply in highly idealised conditions. I believe that something very similar is true of the implications of Modigliani-Miller in relation to the regulatory optimum capital ratio in the banking industry.

Since Friedman (1953), the methodology of economic theory has focused on the development of stylised models with a very limited number of parameters, not necessarily starting from very plausible premises. What is important for Friedman is not so much how reasonable the assumptions are, but rather the possibility of comparing the predictions of the model with the facts.

This methodological approach would be correct if the empirical tests of the theories themselves allowed one to distinguish clearly between alternative theories. In other words, if they had sufficient statistical power. Unfortunately, as Akerlof points out, this is frequently not the case for a number of reasons, and particularly because of problems of simultaneity that make it difficult to interpret the results.

Does it make sense, then, to derive conclusions for economic or regulatory policy from theoretical results that only apply under restricted conditions and whose empirical robustness is far from being tested?

In the case concerning us here, the Modigliani-Miller theorem together with the CAPM asset valuation model offer a very powerful theoretical reference point and a simple analytical framework that allows for a quantitative analysis of the implications of regulatory changes on the cost of financing businesses. With a varying degree of analytical robustness, the empirical results do not allow one to reject the null hypothesis that the Modigliani-Miller theorem may apply (Miles *et al.*, *op. cit.*). However, this does not mean that it is true.

There are many alternative theories based on asymmetrical information and incomplete contracts that offer alternative explanations for the financial structure of banks and businesses. As Patrick Bolton (*op. cit.*) indicates, these theories have not proved capable of offering such operational results as those based upon Modigliani-Miller, and the latter therefore remains the dominant analytical framework. Nevertheless, this does not mean that it represents a good basis for regulatory policy.

References

Akerlof, George A. (2007) "The Missing Motivation in Macroeconomics" *American Economic Review*, March, 97(1): 5-36.

Bank of England (2009), *Financial Stability Report*, June.

Bank of England (2011), *Financial Stability Report*, June.

Basel Committee on Banking Supervision (2010), "An assessment of the long-term economic impact of stronger capital and liquidity requirements", Bank for International Settlements, August.

Berger, Allen N., Richard J. Herring and Giorgio P. Szegö (1995), "The Role of Capital in Financial Institutions", *Journal of Banking & Finance*, 19, 393-430.

Bichsel, Robert and Jürg Blum (2004), "The Relationship Between Risk and Capital in Swiss Commercial Banks: A Panel Study", *Applied Financial Economics*, 14, 591-597.

Blum, Jürg (1999), "Do Capital Adequacy Requirements Reduce Risks in Banking?", *Journal of Banking and Finance*, 23(5), 755,771.

Bolton, Patrick (2011), "Corporate Finance, Incomplete Contracts, and Corporate Control", *Columbia University* working paper.

Boot, A. and S. Greenbaum (1993) "Bank regulation, reputation, and rents: Theory and policy implications", *Capital markets and financial intermediation*, ed. C. Mayer and X. Vives. Cambridge University Press.

Dewatripont, Mathias and Jean Tirole (1993), *The Prudential Regulation of Banks*, The MIT Press.

Flannery, Mark (1989), "Capital Regulation and Insured Banks' Choice of Individual Loan Default Risks", *Journal of Monetary Economics*, 24(2), 235-258.

Friedman, Milton (1953), "The methodology of positive economics", in *Essays in Positive Economics*, Chicago, University of Chicago Press, pp. 3-43.

Gual, Jordi (2009), "El carácter procíclico del sistema financiero", *in Estabilidad Financiera*, n. 16 (May 2009), Published by Banco de España.

Gual, Jordi (2011), "Nuevas regulaciones de capital en banca: una reflexión crítica", *Estudios y Análisis Económico de "la Caixa"*, Working Paper 04/11.

Haldane, Andrew G. (2011), "Capital Discipline", lecture at the meeting of the American Economic Association, Denver, 9 January. Available at the Bank of England website.

Hellmann, Thomas F., Kevin C. Murdock, and Joseph E. Stiglitz (2000), "Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?", *American Economic Review*, 90, No. 1, 147-165.

Hovakimian, Armen and Edward J. Kane (2000), "Effectiveness of Capital Regulation at U.S. Commercial Banks, 1985 to 1994", *The Journal of Finance*, vol. LV, No. 1.

Jensen, M. and W.R. Meckling (1976) "Theory of the firm, managerial behaviour, agency costs and ownership structure", *Journal of Financial Economics* 3:305-360.

Kashyap, Anil K., Jeremy C. Stein and Samuel Hanson (2010), "An Analysis of the Impact of "Substantially Heightened" Capital Requirements on Large Financial Institutions", *Mimeo*, May.

Kim. D. and A. M. Santomero (1988) "Risk in banking and capital regulation", Journal of Finance 43: 1235-1244.

King, Mr R. (2009), "The Cost of Equity for Global Banks: a CAPM Perspective from 1990 to 2009", *BIS Quarterly Review*, September.

Koehn, M. and A. Santomero (1980), "Regulation of bank capital and portfolio risk", *Journal of Finance*, 15, 1235-44.

Miles, David, Jing Yang and Gilberto Marcheggiano (2011), "Optimal Bank Capital", *External MPC Unit for the Bank of England*, Discussion Paper No. 31.

Mink, Mark (2011), "Procyclical bank risk-taking and the lender of last resort", *De Nederlandsche Bank*, Amsterdam, Working Paper No. 301.

Myers, S. and N. Majluf (1984), "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics*, 13, 187-221.

Perotti, Enrico C., Lev Ratnovski and Razvan Vlahu (2011), "Capital Regulation and Tail Risk", *CEPR Discussion Paper*, No. 8526.

Rochet Jean-Charles (2010) "The future of banking regulation" in Dewatripont, M., Tirole, J. and J.C. Rochet *Balancing the Banks. Global lessons from the financial crisis*, Princeton University Press.

Stein, Jeremy C. (2010), Discussant's Comments on: "The Crisis" by Alan Greenspan.

Stiglitz, Joseph E. (1969), "A Re-Examination of the Modigliani-Miller Theorem", *Review of Economics and Statistics*, 59, 784-793.

Stiglitz, Joseph E. (1972), "Some Aspects of the Pure Theory of Corporate Finance: Bankruptcies and Takeovers", *The Bell Journal of Economics and Management Science*, vol. 3, No. 2, 458-482.

"la Caixa" Research Department

Publications

All publications are available on Internet:
www.laCaixa.es/research
E-mail:publicacionesestudios@lacaixa.es

THE SPANISH ECONOMY MONTHLY REPORT

Report on the economic situation (available also in Spanish version)

ANUARIO ECONÓMICO DE ESPAÑA 2011

Avalaible only in electronic format www.laCaixa.es/research

COLECCIÓN COMUNIDADES AUTÓNOMAS

1. **La economía de Galicia: diagnóstico estratégico**
2. **La economía de Illes Balears: diagnóstico estratégico**
3. **La economía de Andalucía: diagnóstico estratégico**
4. **La economía de la Región de Murcia: diagnóstico estratégico**
5. **La economía del País Vasco: diagnóstico estratégico**
6. **La economía de la Comunidad de Madrid: diagnóstico estratégico**

CÁTEDRA "la Caixa" ECONOMÍA Y SOCIEDAD

1. **El tiempo que llega. Once miradas desde España** José Luis García Delgado (editor)

DOCUMENTOS DE ECONOMÍA "la Caixa"

18. **Hacia una nueva arquitectura financiera** Oriol Aspachs-Bracons, Matthias Bulach, Jordi Gual and Sandra Jódar-Rosell
19. **Globalización y *decoupling*. ¿Hacia un mundo emergente desacoplado de las economías avanzadas?** Àlex Ruiz
20. **Inmigración y mercado laboral: antes y después de la recesión** Joan Elias
21. **La recuperación del comercio mundial. Lo que la crisis se llevó** Marta Noguer
22. **Diferencial de inflación con la eurozona: ¿mejora sostenible?** Pere Miret
23. **Perspectivas de desapalancamiento en España** Oriol Aspachs-Bracons, Sandra Jódar-Rosell and Jordi Gual
24. **Los requisitos de capital de Basilea III y su impacto en el sector bancario** Jordi Gual

"la Caixa" ECONOMIC PAPERS

3. **A Value Chain Analysis of Foreign Direct Investment** Claudia Canals and Marta Noguer
4. **Time to Rethink Merger Policy?** Jordi Gual
5. **Integrating regulated network markets in Europe** Jordi Gual
6. **Should the ECB target employment?** Pau Rabanal
7. **Capital requirements under Basel III and their impact on the banking industry** Jordi Gual

WORKING PAPER SERIES

Only available in electronic format at:

01/2011. **Crecimiento *versus* progreso** Jordi Gual

02/2011. **Sobrecalentamiento emergente: Causas, consecuencias y riesgos** Claudia Canals and Marta Noguer

03/2011. **School Dropout in Europe: Trends and Drivers** Maria Gutiérrez-Domènech

04/2011. **The New capital requirements in banking: a critical review** Jordi Gual

05/2011. **Offshoring and Intellectual Property Rights Reform** Claudia Canals and Fuat Sener

06/2011. **Turquía: ¿ajuste macroeconómico en año electoral?** Àlex Ruiz

07/2011. **Estimating capital needs of the Spanish banking system** Maria Pilar Buil and Matthias Bulach

08/2011. **La responsabilidad limitada en los créditos hipotecarios: mitos y realidades** Maria Pilar Buil and Anna Mialet

09/2011. **Tensiones de liquidez y gap comercial: efectos sobre el sistema bancario español** Sandra Jódar-Rosell

10/2011. **The euro crisis: ultimate causes and lasting solutions** Jordi Gual

ECONOMIC STUDIES

36. **El cambio climático: análisis y política económica. Una introducción** Josep M. Vegara (director), Isabel Busom, Montserrat Colldeforns, Ana Isabel Guerra and Ferran Sancho
37. **Europe, Like America: The challenges of building a continental federation** Josep M. Colomer

Academic Advisory Council

The Academic Advisory Council guides the Research Department in its work analyzing the economic and social policies that might be effective in ensuring the progress of Spanish and European society. The members of the Council are:

- Manuel Castells
  Universitat Oberta de Catalunya y University of Southern California
- Antonio Ciccone
  ICREA-Universitat Pompeu Fabra
- Luis Garicano
  London School of Economics
- Josefina Gómez Mendoza
  Universidad Autónoma de Madrid
- Mauro F. Guillén
  Wharton School, University of Pennsylvania
- Inés Macho-Stadler
  Universitat Autònoma de Barcelona
- Massimo Motta
  Barcelona GSE - Universitat Pompeu Fabra
- Ginés de Rus
  Universidad de Las Palmas de Gran Canaria
- Robert Tornabell
  ESADE Business School
- Jaume Ventura
  CREI-Universitat Pompeu Fabra

General Manager

- Jordi Gual
  Executive Director of "la Caixa"

Publishing coordinator: Edicions 62, S.A.
Peu de la Creu 4
08001 Barcelona
www.grup62.cat

Page make-up: Alfa
Design: www.cege.es
Printing: Tallers Gràfics Soler
L. D.: B.6857-2012

0015311178460

"la Caixa"