

**The Economic Impact of Increased Risk Based Capital
Requirements Ernst & Young Economics Consulting
and Quantitative Analysis**

Appendix IV

The Economic Impact of Increased Risk Based Capital Requirements



Ernst & Young Economics Consulting and Quantitative Analysis

E

February 25, 2000

Table of Contents

Overview	1
Possible Impact of Risk-Based Capital Requirements on the GSEs	2
Characteristics of Government Sponsored Enterprises	2
Applicability of Risk-Based Capital Regulation to GSEs	3
Potential Effects of GSE Defaults	3
Possible Responses of the GSEs to RBC Regulations	4
Possible Macroeconomic Impacts of RBC Regulation of GSEs	5
Potential Effects of RBC Regulations on Home Ownership	7
Who is Affected?	8
Conclusions	8
Appendix. Theoretical Background on Capital and Capital Requirements	10
Financial Regulation and the Theory of Capital Requirements	10
Impact of Risk-Based Capital Requirements on Financial Institutions	11
The Effects of RBC Regulations on the Macroeconomy	13
Did the Adoption of Risk-Based Capital Requirements Cause a “Credit Crunch?”	14
References	15

List of Tables

Table 1: Percentage of Fannie Mae Stock Held by Various Groups of Investors	6
Table 2: Impact of a One Percentage Point Increase in Mortgage Rates	8

The Economic Impact of Increased Risk Based Capital Requirements

Overview

This paper analyzes the possible effects of risk-based capital (RBC) requirements on Government Sponsored Enterprises (GSEs). It presents existing research and theory on the potential impact of such regulations. The conclusions of this paper are qualitative in nature. Estimating the costs and benefits of the proposed regulations requires careful quantitative analysis, which is beyond the scope of this work.

This paper finds that the proposed rules would incent the GSEs to respond to binding RBC regulations by:

- purchasing fewer mortgages;
- changing the risk distribution of their assets;
- raising new capital; and/or
- increasing fees and other charges.

These responses could impact the U.S. economy in a number of ways.

- *Mortgage rates could rise*, making it harder for thousands of marginal and first time homeowners to afford a home.
- Reduced home sales would *depress employment and income* in related industries, such as construction, furniture and lumber.
- Similarly, new GSE stock issues would *reduce shareholder value and stock prices*, hurting Americans who, either directly or through their mutual funds and retirement plans, hold GSE stock.
- Finally, as GSEs cut back on targeted programs, individuals in *poorer geographic areas* would be impacted.

The paper begins by discussing the unique characteristics and economic position of GSEs. It then analyzes the likely impact of additional constraining RBC requirements on GSEs, considering different potential responses of GSEs and their impact on different sectors of the US economy. The Appendix contains a theoretical discussion of the purpose of capital regulation for all corporations, the special issues confronting financial institutions, and the theory of banking regulations.

Possible Impact of Risk-Based Capital Requirements on the GSEs

Characteristics of Government Sponsored Enterprises

Government Sponsored Enterprises, such as Fannie Mae and Freddie Mac, are privately held financial corporations that were established through a federal government charter. As corporations, GSEs are owned by shareholders and bondholders and have a fiduciary responsibility to maximize shareholder value. The corporate ownership structure imposes some degree of oversight. At the same time, GSEs are regulated by the federal government (Fannie and Freddie are regulated by the Office of Federal Housing Enterprise Oversight, or OFHEO) and have Congressionally-mandated housing goals similar to Community Reinvestment Act (CRA) goals for banks.

The primary mission of Fannie Mae and Freddie Mac is to purchase and securitize mortgages from banks and S&Ls, thereby increasing liquidity in the primary mortgage market and creating a secondary market. GSEs also issue Mortgage Backed Securities (MBS), which are a pass-through vehicle that packages the payment streams of pools of mortgages together with a guarantee of the repayment of interest and principal. The GSEs assume the default risk (but not the prepayment risk) on the mortgages in the pool.

Implicit Government Insurance of GSE MBS

Some investors believe that Fannie Mae and Freddie Mac are too important to the smooth functioning of the housing market to be allowed to become insolvent. In other words, Fannie Mae and Freddie Mac are perceived by some to be “too big to fail,” and the financial markets could reflect that their obligations have an implicit government guarantee.¹ Analysts who contend that Fannie and Freddie receive implicit government insurance claim that the prevailing gap between returns on GSE securities (both MBS and debt issues) and U.S. Treasury securities is too small to reflect a risk premium for the possible insolvency of the GSEs. This is taken as evidence of the presence of implicit government insurance.

It is important to note that differences in market rates of return on various securities reflect only investor *perception*, which might be different from reality. Under current bank risk-based capital regulations, Fannie and Freddie MBS receive a 20% risk weight, while U.S. Treasuries and Ginnie Mae securities receive a risk weight of zero, indicating that bank regulators do not perceive Fannie and Freddie to be covered by an implicit government guarantee, and that regulated investors in Fannie and Freddie securities incur a higher regulatory capital charge which makes holding Fannie and Freddie securities more costly than holding U.S. Government and Ginnie Mae securities. Furthermore, investors must take into consideration that the classification of Fannie Mae and Freddie Mac securities as “agency” securities gives the institutions broader access to investor market segments not available to other bond issuers, since

¹ Unlike Fannie Mae and Freddie Mac, GNMA (“Ginnie Mae”) has its MBS backed by the “full faith and credit” of the United States Government. This means that even if GNMA were to become insolvent, the federal government would guarantee the timely payment of principal and interest under the original terms of the MBS pass-through agreement. From the investor’s perspective, this guarantee makes Ginnie Mae securities as secure as U.S. Treasury bonds, and the bank and S&L RBC weighting given to these securities is the same as that for U.S. Treasuries.

pensions and other large funds can hold larger percentages of “agency” securities than privately issued securities. This creates a market segmentation premium for GSE securities.

Applicability of Risk-Based Capital Regulation to GSEs

The hybrid structure of the GSEs makes them different from depository financial entities like banks with regard to the application of risk-based capital regulation. The likely effects of the application of such regulations to the GSEs should be evaluated after taking into account similarities and differences between banks and GSEs.

First, a GSE *does not have depositors*. As described in the Appendix, depositor uncertainty about bank solvency is a key factor in bank runs and the possibility of contagion after bank failure. The potential for contagion effects through depositors does not exist in GSEs, because the debts of the GSEs are not callable like demand deposits. However, the reputation for soundness of the GSEs is still important, as the ability for the enterprises to roll over debt would be impaired by the perception that the probability of default had increased.

Second, the purchasers of GSE issued securities are *sophisticated money managers*, including pension funds, banks, mutual funds and corporations. These individuals are far better equipped to monitor the market for these securities than an individual depositor is to monitor all of the financial affairs of a bank.

Finally, GSEs work under unique constraints in that their *charters limit risks* by design. The GSEs are constrained to buy only low-risk, high-quality residential mortgages. These mortgages are less likely to default, making mortgages held or guaranteed by the GSEs safer investments than MBS issued by other financial entities on loans that are “non-conforming” or not within the parameters set by the charters of the GSEs. The “conforming” loans purchased by the GSEs often exceed the minimum collateral threshold required by their charters, meaning that the portfolio held by the GSE, is less risky than that allowed by their charter.

Potential Effects of GSE Defaults

Risk-Based Capital requirements for GSEs are designed to mitigate the risk of default on GSE securities, including MBS. Based on the differences between banks and GSEs, the results of such a default would be different from those of a bank insolvency. The likely effects of a GSE MBS default are the following:

First, if the GSEs were to default on their MBS, institutional bondholders would experience reductions in the value of their portfolios. This group includes the GSEs themselves, who also hold their own securities. The investment portfolios of banks and S&Ls can also contain some percentage of MBS issued by the GSEs. This could necessitate portfolio rebalancing on the part of some institutions, and disruptions to the financial sector while these adjustments took place. If the level of default surpasses that envisioned in the RBC requirements for banks or S&Ls, failures of these types of institutions could also result.

Second, there are also *potential contagion effects* from one GSE to another, and to the financial sector more broadly. If one GSE defaults on its MBS, potential purchasers of all MBS might perceive this as an indication that all MBS were more risky than previously thought. This would

result in increased risk premiums for these securities, reflected as lower prices obtained by the GSEs for new securities. The burden of the decrease in the price obtained may also be passed through to lenders, who will receive less for securitizing mortgages in their portfolios, or to homebuyers, who pay higher fees or rates of interest to cover the loss in value from securitization. In extreme cases, the GSEs might not be able to issue additional MBS.

Possible Responses of the GSEs to RBC Regulations

As discussed in the Appendix, if GSEs are required to hold more capital reserves, they have fewer funds available to purchase mortgages. Therefore, additional constraining capital requirements are similar to a tax on every mortgage a GSE purchases. If capital requirements are set high enough, they can have the perverse effect of forcing regulated institutions farther out on the risk curve in an attempt to generate adequate expected returns. The following section lists the possible responses of the GSEs to binding regulatory capital constraints.

If GSEs were required to increase their capital above existing levels, they may respond by *purchasing fewer loans* until their actual capital covers the regulatory capital required for the mortgages they purchased. As a result, banks would sell fewer mortgages to the GSEs, and would consequently have to reduce the number of mortgages they write or increase the number of mortgages they hold in their portfolios. The access to credit would be reduced for some prospective homeowners. Banks would issue fewer mortgages, contracting supply until the interest rate reached a higher level that supports profitability for bank-funded mortgages as opposed to GSE-funded mortgages.

Like banks, GSEs may respond to the imposition of RBC by *changing the distribution of assets* in their portfolio from “high risk” to “low risk” assets. For example, the GSEs could shift away from high loan-to-value (LTV) loans to lower LTV loans, or change underwriting requirements, as long as these changes did not violate their charter or previous commitments. This impact will be most pronounced for those products where the regulatory capital requirement creates the largest marginal capital increase. For example, since the GSEs are currently being asked to meet additional societal goals without increasing existing rates, to the extent the Enterprises must cross-subsidize to engage in these higher risk activities, the imposition of binding risk-based capital requirements will limit their ability to meet these goals.

GSEs, like any other financial corporation, could also respond to the RBC requirements by *raising new capital*. This would typically be done by issuing new stock, although the GSE could also issue subordinated debt or retain earnings. The new stock would allow the financial institution to meet the capital requirements, but would reduce the returns and shareholder value. In turn, the reduced returns would increase funding costs, reducing the number of loans that could be funded. As in the case of banks in the 1990s, the prevailing economic conditions will determine whether this is a viable option for the GSEs.

The GSEs could also attempt to pass on the additional costs of binding RBC requirements as higher fees and other charges on originating institutions. If banks passed these costs on to homebuyers as additional fees, higher interest rates or additional points, homeowners would bear

the burden. If banks absorbed these additional costs instead of passing them on, profitability would be reduced, which would lower their shareholders' returns and dividends.

Possible Macroeconomic Impacts of RBC Regulation of GSEs

The responses described in the previous section could have an impact on the larger economy. The nature and size of the impact would depend on a number of circumstances, including the existing economic climate and the nature of the GSEs' response. In addition, the regulations should take into account the special role of the GSEs in the credit transmission mechanism and the potential impact of disturbing the mortgage securitization system on the real economy.

Fannie Mae and Freddie Mac have brought increased economies of specialization (bringing underwriting expertise to banking industry) and economies of scale (making it cheaper to evaluate the creditworthiness of each borrower through automated underwriting) to the mortgage banking industry. These are two of the attributes usually assigned to justify why banks are "special" in the delivery of the credit transmission mechanism. From the "credit view" perspective of monetary transmission, the GSEs take on the role of providing the functions that make the mortgage credit transmission mechanism special -- allowing banks to focus on the deposit base and economies of scope (efficiencies of providing multiple lending services).

Therefore, a cutback on Fannie and Freddie's ability to support the mortgage credit transmission mechanism will have real economic impacts by cutting mortgage credit access, consumer spending on the housing markets and/or decreasing the real return to savings. Furthermore, using an extension of the Gertler and Gilchrist arguments,² it will be the atypical or marginal borrower that will be the most impacted -- contradicting the social goals of Fannie Mae and Freddie Mac to expand access to credit for those unable to get credit in the market. The following changes to the economy could take place as a result:

Mortgage rates could rise. If GSEs were to raise fees charged, for instance, those additional costs could likely be passed on to borrowers in the form of higher mortgage rates. Similarly, if GSEs were to restructure their assets away from higher-risk mortgages, or were to purchase fewer mortgages, banks would either have to write fewer mortgages or retain more of the mortgages they write on their books, increasing their credit and liquidity risk, causing borrowing costs and mortgage rates to increase.

As discussed above, GSEs deal in "conforming" mortgages that have an original principal amount below a defined level (\$240,000 in 1999). GSEs play an important role in keeping interest rates low for such mortgages. The average interest rate for a conforming 30 year fixed mortgage was 8.11% during the second week of February 2000, while the comparable rate for a "jumbo" (non-conforming) 30 year fixed mortgage was 8.37%.³ This is consistent with the existing empirical literature, which concludes that conforming conventional mortgages that are eligible to be purchased by the GSEs carry a 25 to 45 basis point lower mortgage rate. Wachter, et. al. (1996) find that a 50 basis point increase in mortgage interest rates results in approximately a two percent increase in homeownership costs. Assuming that RBC regulations

² Refer to the Appendix for further discussion of the Gertler and Gilchrist arguments.

³ Bank Rate Monitor, <http://www.bankrate.com/brm/rate/avg_natl.asp>, accessed February 16, 2000.

equalized the interest rates on conforming and non-conforming mortgages, the result would be an increase in home prices of between one and two percent for homebuyers seeking conforming mortgages. Constraining capital requirements on GSEs would most impact these loans, and would *disproportionately hurt first time and low income homebuyers*, who are most likely to have conforming loans.

If GSEs react by reducing the number of mortgages they purchase and/or by moving toward lower risk assets, banks would be unable to write as many mortgages. Similarly, if a GSE fee hike results in higher mortgage rates, many Americans would no longer be able to afford homes. Reduced home sales can have a *detrimental impact on the economy* because, as employment and income decline in the construction and real estate businesses, these changes filter into other sectors of the economy. According to the Mortgage Bankers Association, every \$1,000 in reduced economic activity in the real estate industry produces an additional \$400 in lost income in the larger U.S. economy. In addition, liquidity would be reduced in the economy as real estate becomes harder to sell.

If GSEs were to respond by issuing new stock, their stock prices would probably fall as shareholders anticipate lower future returns and shareholder value. Table 1 shows the distribution of Fannie Mae stock. Based on this information, the reduction in shareholder value would impact a wide variety of Americans. While Table 1 shows most Fannie Mae stock as held by institutional investors, it is important to remember that much of the money being invested by these institutions belongs to households. Investments in Fannie Mae stock may be made directly, through mutual funds, or through another financial intermediary, such as an investment manager or pension fund.

Table 1: Percentage of Fannie Mae Stock Held by Various Groups of Investors

Group	Percentage of Fannie Mae Stock Outstanding
Investment managers	30%
Mutual funds	29%
Retail (individuals)	17%
Banks	15%
Public pension funds	4%
Insurance companies	3%
Foreign	2%
Total	100%

Source: the Carson Group

Finally, as with any other form of risk-based capital regulation, if RBC requirements are not aligned with the actual risk profile of the GSEs, they present incentives for the GSEs to seek riskier investments in categories with low marginal capital requirements. In other words, misaligned RBC requirements can have the perverse effect of providing incentives toward riskier behavior, or toward excessive avoidance of certain risks (e.g., investing in Treasury securities at the expense of mortgages).

Potential Effects of RBC Regulations on Home Ownership

The macroeconomic effects of Risk-Based Capital regulation, such as an increase in mortgage rates, would increase the qualifying income required to purchase a home. A number of households that could have formerly qualified to purchase homes would no longer qualify, would be forced to purchase a less expensive home, or would have to pay a larger down payment. The exact number of households impacted, however, would depend on how many households are on the threshold of narrowly qualifying and would no longer qualify after the rate increases.

A number of studies have estimated the impact of mortgage rate changes on home affordability. The Census Bureau, for instance, estimates that about 670,000 families would have been priced out of the market for a median priced home in 1995 if mortgage rates increased by one percentage point. This study does not account for the fact that not all of these families were looking to buy a house, and does not consider the impact on families looking to buy homes priced below the median home price. The National Association of Homebuilders estimates that 178,000 fewer homes would have been sold in 1987 if mortgage rates increased by one percentage point. Unlike the Census estimates, this estimate only looks at households that are likely to buy a house. However, it still does not account for home sales at other price levels. The Mortgage Bankers Association of America's study estimates that 450,000 fewer homes would be sold in 1998 if mortgage rates rose by one percentage point. This estimate looks at homes at all price levels and at households likely to buy homes. The estimates are based on the historical relationship between interest rates and home sales. However, in estimating this relationship, this study does not include the impact of other factors, such as macroeconomic conditions. In summary, there are a number of existing studies that attempt to quantify the impact of mortgage rate changes on home affordability. While all of the studies work with different years and have some limitations, taken together, they suggest that changes in mortgage rates could have a significant impact on home affordability for U.S. households.

Table 2: Impact of a One Percentage Point Increase in Mortgage Rates

Study	Year	Impact
Mortgage Bankers Association of America	1998	450,000 fewer homes sold during 1998 (200,000 first-time buyers).
US Census Bureau	1995	670,000 fewer families (66,000 current renters) could afford to buy a median priced home in 1995.
National Association of Homebuilders	1987	178,000 fewer median priced homes sold during 1987 (45,000 new homes)

Sources: U.S. Census Bureau, "Who Could Afford to Buy a House in 1995?" August 1999; U.S. Census Bureau, "Table 5-1: Effect of Changes in Interest Rates on Affordability Status of Families and Unrelated Individuals for a Median-Priced Home, by Current Tenure and Type of Financing: United States, 1995"; Mortgage Bankers Association of America; David Crowe, "Mortgage Interest Rates and Housing Affordability", National Association of Homebuilders.

Who is Affected?

The economic impacts discussed above are most likely to impact certain segments of the population. The impacted households are most likely to be from segments that are hoping to improve their financial situation and quality of life:

- For instance, increases in mortgage rates and reductions in credit availability would most heavily affect *marginal borrowers* – individuals with relatively high debt payment to income ratios or *first time homeowners* who would have narrowly qualified before the capital requirement increases.
- *Geographic areas that are not economically healthy* would also be disproportionately affected, as the GSEs cut back on targeted programs, since targeted program participants are more likely to live in these areas.
- The fall in stock prices would impact *existing shareholders*. In addition to the 40 percent of U.S. corporate equities held directly by households, an additional 42 percent are held by retirement plans and mutual funds, much of it on the behalf of households. Those individuals who own Fannie or Freddie stock directly or indirectly through mutual funds or pension plans could see their investments lose value to the extent that the proposed regulations require levels of actual capital to exceed economic capital.
- *Workers in the construction and real estate industries* would also be impacted as home sales fall. Furniture, lumber, and other home-based sectors of the economy would also be affected first, but the impact could then spread from these industries to the larger economy as workers in affected industries earn and spend less.

Conclusions

Risk-Based Capital regulation would import ideas from banking regulation and apply them to the GSEs. RBC regulations, such as those resulting from the Basle Accord, address important issues in the regulation of banks. However, there are important differences between banks and GSEs that should be considered when applying RBC regulations to GSEs. Ideally, actual, economic, and regulatory capital should be aligned. In other words – to avoid imposing unwarranted costs on the industry and on borrowers, it is important to set regulatory capital levels so that they equal, but do not exceed, economic capital. In other words, if actual capital is less than economic capital, RBC regulations can ensure that adequate capital is provided to cover unexpected events – but only if done correctly. Otherwise, such regulations are potentially distorting and could have unanticipated adverse consequences.

RBC regulations proposed for the GSEs should be evaluated to determine whether the level of regulatory capital is sufficient or excessive, whether the methodology used to determine the level of regulatory capital produces stable results, and whether the rules are clear, easily implemented, and do not create incentives for gaming, such as shifting assets within a class to those that are the riskiest. It is also important to remember that, if regulatory capital exceeds current actual capital, the imposition of binding RBC requirements on the GSEs cannot be accomplished without cost. Evidence from the “credit crunch” of the early 1990s shows that some groups and geographic areas could be affected more than others. First time homebuyers and marginal borrowers could be particularly affected. In addition, the construction and real estate industries could be adversely impacted, as could geographic areas that are not economically healthy. Therefore, from a public policy perspective, it is critical that RBC requirements imposed on GSEs reflect as closely as possible realistic expectations of the risk facing the GSEs.

Appendix. Theoretical Background on Capital and Capital Requirements

This appendix provides some theoretical background on capital and the role of capital requirements in the regulation of financial institutions. It identifies important concepts and provides a theoretical review of the macroeconomic impact of risk based capital regulations.

Capital is defined to be the difference between the market value of a firm's assets and liabilities, representing the funds available to a firm to operate a business and to protect itself against a variety of risks associated with its portfolio. These risks include: operations risk, which is the possibility of a large loss due to a failure of the existing business controls or systems; management risk, which is the possibility of loss due to mismanagement; credit risk, which is the possibility of loss due to default and loss on the part of a borrower from the corporation; market risk, which is the possibility of loss of value of securities; and interest rate risk, which is the possibility of loss due to changes in interest rates when the duration of the firm's assets and liabilities are mismatched.

Most financial institutions, such as banks, S&Ls and insurance companies are subject to government regulations specifying the amount of capital reserves these institutions must hold. These regulations are required by special characteristics of the financial sector, including the presence of information asymmetries and the important role the financial sector plays in the credit transmission mechanism. The theoretical basis for these regulations is discussed in the following section.

Financial Regulation and the Theory of Capital Requirements

Depository financial institutions – banks and S&Ls – take on risks as part of their role as financial intermediaries. Their liabilities are typically short term (depositors can demand immediate access to their funds), while their assets are often in the form of longer term investments – primarily loans. Banks must maintain adequate capital reserves to serve as a buffer against financing risks such as those arising from mismatched asset and liability durations, operational risks, or credit risks, i.e., any unexpected event that requires funding. If capital is insufficient, the bank becomes insolvent, or bankrupt.

Most depositors do not have enough information to evaluate the soundness of a financial institution's risk management strategy, and consequently cannot identify institutions that are unlikely to become insolvent during stressful circumstances.⁴ This inability to distinguish financially sound banks results in the potential for two destructive events. The first is a *bank run*. If a bank gains the reputation for being financially unsound, either due to the facts or to hearsay, depositors have the incentive to withdraw their funds as quickly as possible, before the bank becomes insolvent. If the bank does not have sufficient liquid funds to bolster depositor confidence by returning funds to all who ask, the bank does indeed become insolvent, regardless of its original condition, resulting in a self-fulfilling prophecy. Furthermore, one bank run can produce others, through a process called *contagion*. Since depositors do not know the soundness

⁴ See Morgan (1997) for an investigation of the factors that determine bank opacity.

of any bank with certainty, the failure of one bank can decrease confidence in other banks, causing additional bank runs and a larger financial crisis. If unchecked, contagion might severely damage the entire banking sector.

To reduce the likelihood of individual bank runs and contagion, the United States implemented a *federal deposit insurance* program by setting up the Federal Deposit Insurance Corporation (FDIC) under the Banking Act of 1933, and its sister organization, the former Federal Savings and Loan Insurance Corporation in 1934. FDIC currently insures accounts of up to \$100,000 against losses from bank liquidation. If the assets of the bank are insufficient to meet all depositor claims, the federal government makes up the difference through the FDIC fund, so that depositors receive the full amount up to \$100,000. This insurance is paid for by premiums charged to banks.

The FDIC program has been very successful in reducing contagion over an extended period of time. However, it also has less beneficial side-effects. At an FDIC insured bank, depositors will receive their deposits (up to \$100,000) back no matter what happens to the bank. This reduces the depositors' interest in analyzing the soundness of the bank. Furthermore, bank managers have an incentive to take excessive risks, since risky investments promise better returns, while deposit insurance protects against loss of funding.⁵ For these reasons, deposit insurance alone has been deemed insufficient to protect the financial sector.

The United States has also implemented capital requirements, which dictate the level of capital reserves a bank or S&L must hold as a percentage of its assets. These requirements have been established to (1) minimize contagion and systemic risk, (2) provide collateral against FDIC insurance and the need to divert other public resources to support the banking system, and (3) protect against fraud.

Bank capital regulation proceeded in a piecemeal fashion, until the late 1980s, with individual countries implementing different regulations based on their views of sound bank regulation. As a result of differences in regulation across countries, there was concern that banks located in nations with stricter capital requirements bore higher capital costs and consequently faced a competitive disadvantage. In order to maintain a "level playing field," the international financial community agreed to develop uniform risk based capital (RBC) requirements to risk weight the assets held by a depository institution and determine the amount of capital reserves required by that bank to maintain solvency under all but extraordinary circumstances. In 1988 the G-10 group of countries adopted common minimum RBC requirements under the the Basle Accord. While the Accord was not binding on any member nation, each of the participants adopted local capital rules soon thereafter implementing it. The Accord has been amended over the years, most significantly to account for the market risk exposure of internationally active trading banks, and it is currently undergoing further changes.

Impact of Risk-Based Capital Requirements on Financial Institutions

In order to assess the impact of RBC regulations, one must distinguish between three different concepts of capital: actual capital, economic capital and regulatory capital. *Actual capital* (or

⁵ Deposit insurance does not remove all of the downside risk of bank failure -- stockholders, bondholders and large depositors could still lose substantial amounts of money, and the bank's management could lose their jobs.

GAAP Capital) is the amount of capital shown on the company's books. *Regulatory capital* is the capital reserve mandated by the regulations governing the corporation. *Economic capital* is the amount of capital necessary to cushion the corporation's operations against a predetermined percentage of the adverse outcomes to which a corporation could possibly be subject without a serious disruption in business. Economic capital will vary by company and change with economic conditions, but is most frequently determined using risk management techniques, such as Value-at-Risk (VAR) computations or stress tests.

In the absence of government intervention to set the level of regulatory capital, actual capital could be greater or less than the value of economic capital. If actual capital is greater than economic capital, the corporation is overreserving against possible risks and the excess capital could be used in more profitable activities. If actual capital is less than economic capital, the corporation is underreserving, and thus may be sacrificing long-term survival for short term profits.

When actual and economic capital do not coincide, the efficiency of the economy can be improved by bringing actual capital closer to economic capital. When actual capital is greater than economic capital, the stockholders in the corporation can exercise their control over the board of directors to reduce capital reserves. In general, the government considers these controls adequate to assure that actual capital does not exceed economic capital. On the other hand, when actual capital is less than economic capital, government regulation, such as risk-based capital requirements, may be necessary to ensure adequate capital holdings.

An evaluation of the impact of RBC requirements on financial institutions depends first on the extent to which the capital requirements are *constraining or binding*. If the regulatory capital is less than actual capital, then the regulations are non-constraining, and the firm is already operating with capital that meets regulatory requirements. When RBC requirements are constraining, a financial institution must develop a portfolio adjustment strategy to comply with them. An analysis of data on banks in the United States, the United Kingdom, and Switzerland, suggest that the provisions of the Basle Accord were constraining on undercapitalized banks in these countries.⁶ The responses available to a constrained institution can be divided into three major categories: (1) raising new capital, (2) reducing lending to borrowers in "risky" categories; and/or (3) shrinking the portfolio.⁷ While these strategies allow a financial institution to comply with the RBC requirements, they can also impose additional costs, as discussed below.

Financial institutions can comply with constraining capital requirements by *raising new capital* in the form of new stock, retaining earnings, or issuing subordinated debt. Issuing new stock reduces the returns and shareholder value for existing shareholders. In turn, the reduced returns can increase funding costs for the financial institutions and lower production. Retaining earnings could reduce planned dividends. It should be noted that equity finance could have unintended side-effects. Myers and Majluf (1984) find that, under imperfect information, markets may interpret an announcement of a new equity issuance as a sign of underlying asset weakness --

⁶ Jackson, et. al. (1999) review the literature on the effects of regulation on capital ratios.

⁷See Peek and Rosengren (1995)

thereby depressing the stock price and increasing the cost of equity finance.⁸ The success of an equity issue could also depend on macroeconomic factors. When RBC regulations for banks were implemented in the early 1990s, the economic recession taking place at that time limited the use of this option.

Since risk-based capital requirements impose a greater risk weight on relatively high-risk activities, *reducing the flow of investment into high-risk-weighted assets* could allow an institution to meet its capital requirements. For instance, a constrained bank may slow or stop investment in commercial loans (risk based weight of 100%) while increasing its holdings of government bonds (risk based weight of zero). Such a response would reduce the access to credit for particular classes of borrowers.

Finally, financial institutions may respond to constraining financial regulations by *shrinking their existing investment portfolio* until the existing capital reserves cover the risks of the assets they retain. This can be accomplished through the sale of assets, the proceeds from which could then be retained to increase the size of the capital reserve.

Jackson *et. al.* (1999) review the existing literature and conclude that there is evidence that financial institutions may undertake each of the above strategies, depending on their relative costs. The choice of method will also determine the length of time required for the financial institution to conform to the regulation, as loan portfolios adjust more slowly than portfolios of other financial assets.⁹

The Effects of RBC Regulations on the Macroeconomy

The classical view of monetary policy assumes perfect substitutability between different types of nonmoney assets. This implies that the level of borrowing in the economy is determined by the prevailing real interest rate and the productivity of capital, but not the institutional structure of the banking system. If this model accurately represented the financial sector of the economy, RBC requirements would have no macroeconomic effects, because other forms of debt finance, such as bond issues, would be substituted for bank loans.

Bernanke (1992) argues that if banks are "special" agents in the credit transmission mechanism then contrary to the traditional analysis, factors that decrease the amount of credit channeled through banks will have real macroeconomic effects.¹⁰ These macroeconomic effects occur because the reduction in credit transmitted could lead to a reduction in spending by bank-dependent borrowers or a decline in the net return to savings, or both. One source for these reductions in credit could be regulatory costs associated with RBC constraints.

This "credit view" of monetary transmission takes the classical money view of monetary policy and relaxes the assumption concerning asset substitutability. That is, monetary action can impact

⁸ Stewart Myers and Nicholas Majluf, "Corporate Finance and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics*, 1984, pp. 187-221.

⁹ See Hancock *et. al.* (1995) for an analysis of the response of bank portfolios to capital shocks.

¹⁰ Bernanke, "Credit in the Macroeconomy," FRBNY Quarterly Review, Spring 1992-1993.

the macroeconomy by affecting the availability or cost of bank loans. In Bernanke's model, bank loans are explicitly treated as a third category given their "special" role in credit transmission. When monetary policy increases short-term interest rates, banks have to cut back on lending or increase the cost of loans. Empirical studies show that bank loans are not completely substitutable, forcing borrowers to cut back on funding projects and reducing spending -- adding an additional macroeconomic constraint on the economy. Gertler and Gilchrist demonstrate that the hardest hit tend to be borrowers that take the greatest advantage of why banks are "special" -- small businesses and consumers that cannot turn to other sources of funds.

Did the Adoption of Risk-Based Capital Requirements Cause a “Credit Crunch?”

In the early 1990s, the United States, experienced a “credit crunch” that curtailed economic activity as banks reduced their lending. The credit crunch was likely caused by a number of factors. Some research argues that the imposition of the Basle Accord in 1988 caused the phenomenon by channeling funds away from asset categories classified by the new regulations as high risk. Other research identifies other causative factors: the imposition of Federal Deposit Insurance Corporation Improvement Act (FDICIA) mandated prompt corrective action in response to bank undercapitalization, and regulatory agencies focused increased attention on undercapitalization issues.

Brinkmann and Horvitz (1995) show that banks with lower capital ratios experienced the slowest growth from 1987 to 1991. For these banks, regulatory capital requirements represented the greatest burden and forced them to restrict the issuance of new loans to borrowers. However, even banks that narrowly met the new RBC requirements slowed the growth of their portfolios, possibly to build back a cushion of capital. For more capitalized institutions, the new regulatory requirements may not have exceeded the banks existing capital, creating less of an impact. The existing research, therefore, links capital regulation to the credit crunch, although there is mixed evidence that the Basle Accord was the sole cause.¹¹ Nonetheless, the credit crunch of the 1990s is evidence that capital regulation has real economic impacts.

Nor did the credit crunch of the early 1990s affect all borrowers equally. As the “credit view” model of monetary transmission would predict, large corporations and other borrowers who could substitute away from bank loans were least affected. Gertler and Gilchrist found that corporations actually increased bank borrowing during this time and banks redirected lending from smaller borrowers to corporations. Most affected were small business borrowers who had few potential lenders aside from local banks.¹² Also, the credit crunch affected the real estate market. Weber and Devaney (1999) estimate a drop in real estate lending equivalent to 2.7% of bank assets due to the imposition of risk-based capital requirements in the early 1990s.

¹¹ See Hancock et. al. (1995) for a brief review of the different explanations of the early 1990s' capital crunch.

¹² See Peek and Rosengren (1995)

References

- Berger, Allen N., and Gregory F. Udell. 1994. "Did Risk-Based Capital Allocate Bank Credit and Cause a 'Credit Crunch' in the United States?" *Journal of Money, Credit and Banking*, Vol. 26, No. 3. pp. 587-628. (August).
- Bernanke, Ben, "Credit in the Macroeconomy", FRBNY Quarterly Review, Spring 1992-93.
- Bernanke, Ben, and Cara S. Lown, "The Credit Crunch," *Brookings Papers on Economic Activity*, 2, 1991, pp. 205-246.
- Blinder, Alan and Joseph Stiglitz "Money, Credit Constraints and Economic Activity, " *American Economic Review*, May, 1983, 297-302).
- Brinkmann, Emile J. and Paul M. Horvitz, "Risk-based Capital Standards and the Credit Crunch." *Journal of Money, Credit and Banking*, Vol. 27, No. 3 (August 1995) pp. 848-863.
- Congressional Budget Office. 1996. "Assessing the Public Costs and Benefits of Fannie Mae and Freddie Mac." Washington, DC (May).
- Congressional Budget Office. 1991. "Controlling the Risks of Government-Sponsored Enterprises." Washington, DC (April).
- Fama, Eugene. 1985. "What's Different About Banks" *Journal of Monetary Economics*, Vol. 15, pp. 29-39.
- Gerlter, Mark and Simon Gilchrist, "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms, "NBER working paper #3892, November 1991
- Gerlter, Mark and Simon Gilchrist, "The Role of Credit Market Imperfections in the Monetary Transmission Mechanism: Arguments and Evidence, " New York University (unpublished as of 1993).
- Gyourko, Joseph, and Joseph Tracy. 1999. "A Look at Real Housing Prices and Incomes: Some Implications for Housing Affordability and Quality." *Federal Reserve Bank of New York Economic Policy Review*, Vol. 5, No. 3. (September).
- Hancock, Diana, Andrew J. Laing, and James A. Wilcox. 1995. "Bank Capital Shocks: Dynamic Effects on Securities, Loans and Capital." *Journal of Banking and Finance*, Vol. 19. pp. 661-677.
- Jackson, Patricia, et. al. 1999. "Capital Markets and Bank Behaviour: The Impact of the Basle Accord." Basle: Bank for International Settlements. Basle Committee on Banking Supervision Working Papers, No. 1.
- Johnson, Ronald, "The Bank Credit Crumble," *Federal Reserve Bank of New York Quarterly Review*, Summer 1991, pp. 40-51.
- Kane, Edward J. 1999. "Housing Finance GSEs: Who Gets the Subsidy?" *Journal of Financial Services Research* (May).

- McConnell, Margaret M., Patricia C. Mosser, and Gabriel Perez Quiros. 1999. "A Decomposition of the Increased Stability of GDP Growth." *Current Issues in Economics and Finance*. Federal Reserve Bank of New York. (September).
- Modigliani, Franco, and Frank Fabozzi. 1996. *Capital Markets: Institutions and Instruments*. Upper Saddle River: Prentice Hall.
- Morgan, Donald P. 1997. "Judging the Risk of Banks: What Makes Banks Opaque?" Federal Reserve Bank of New York. (September 14).
- Myers, Stewart and Nicholas Majluf, "Corporate Finance and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics*, 1984, pp. 187-221.
- Peek, Joe, and Eric Rosengren. 1995a. "The Capital Crunch: Neither a Borrower nor a Lender Be" *Journal of Money and Credit*, Vol. 27, No. 3. pp. 625-638. (August).
- Peek, Joe, and Eric Rosengren. 1995b. "Bank regulation and the credit crunch" *Journal of Banking and Finance*, Vol. 19, pp. 679-692.
- Stiglitz, Joseph E., and Andrew Weiss. 1981. "Credit Rationing in Markets with Imperfect Information" *American Economic Review*, Vol. 71, No. 3. pp. 393-410.
- Wachter, Susan, et. al. 1996. "Implications of Privatization: The Attainment of Social Goals" in U.S. Department of Housing and Urban Development, *Studies on Privatizing Fannie Mae and Freddie Mac*.
- Weber, William and Michael Devaney. 1999. "Bank Efficiency, Risk-Based Capital, and Real Estate Exposure: the Credit Crunch Revisited." *Real Estate Economics* (Spring).

APPENDIX TO CONSULTING LETTERS

1.	Operational Workability	Appendix V-1
2.	Yield Curve Specification	Appendix V-2
3.	Non-Treasury Interest Rates	Appendix V-3
4.	Mortgage Spreads	Appendix V-4
5.	Special Risk Premium on Fannie Mae and Freddie Mac Debt	Appendix V-5
6.	Home Price Scenario	Appendix V-6
7.	Home Price Volatility	Appendix V-6
8.	Single Family Default, Prepayment, and Severity	Appendix V-7
9.	Multifamily Default, Prepayment, and Severity	Appendix V-8
10.	Credit Enhancements and Haircuts	Appendix V-9
11.	Refunding and Reinvestment	Appendix V-10
12.	Administrative Expenses	Appendix V-11
13.	Dividends	Appendix V-12
14.	Mortgage Commitments	Appendix V-13
15.	Non-Earning Assets	Appendix V-14
16.	Risk-Based Capital Calculation	Appendix V-15