

EXTREMELY Preliminary
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Why Do Large Banking Organizations Hold So Much Capital?

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Large banking organizations in the U.S. appear to hold significantly more equity capital than is required by bank regulators and these equity buffers have grown significantly over time. The ratio of banking industry book equity to total assets has increased by more than half from 1990 to 2006 (from 6.4% to 10.1%), and the proportional rise has been even higher for large banking organizations (from xxx% to xxx%). We propose and test a number of hypotheses of this phenomenon. Our preliminary findings suggest that some of the capital increases in the early 1990s are very likely attributable to regulatory changes in capital guidelines (implementation of Basel I, leverage ratios, prompt corrective action rules). Later increases are more likely due to the historically high returns on equity, many of which are retained and reinvested profitability in the banks, and/or supervisory pressures on large organizations to hold high capital ratios to protect the safety and soundness of the financial system. Other hypotheses also appear to play important roles...

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1. Introduction

Large U.S. banking organizations hold surprisingly high capital ratios – both in terms of standard equity-to-asset ratios and regulatory capital ratios – and this behavior has persisted over a number of years. Since the early 1990s, large institutions have raised their capital ratios considerably both on an absolute basis, and on a relative basis to the ratios of small institutions. Perhaps most surprising, the large organizations hold significant equity cushions above all of the minimum regulatory requirements. The goal of this paper is evaluate several hypotheses of why these ratios are so high. [ALLEN: This is all written in terms of book capital values. But we will be considering—in at least some of our tests—market value capital. So eventually, the text in this document will have to re-worked to reflect this.]

To illustrate, as of September 2006, the top 50 U.S.-based bank holding companies (BHCs) as a whole had an equity capital to total assets ratio of 8.39%, almost double (???) the level of the 1980s. In terms of regulatory ratios, these BHCs had an aggregate Total risk-based capital ratio of 11.74%, a Tier 1 risk-based ratio of 8.57%, and a Tier 1 leverage ratio of 6.21%. All three ratios are more than a full percentage point above the “well capitalized” level, and even further above the “adequately capitalized” level needed to satisfy regulatory minimums and to avoid penalties under the prompt corrective action (PCA) rules.

One hypothesis of why banks hold capital well in excess of regulatory minimums may be unobserved pressures from bank supervisors. Supervisors may generally require higher capital for large organizations to protect the safety and soundness of the financial system, or may target the very largest institutions with a significant combined proportion of assets deemed to pose significant systemic risks to financial stability. Bank supervisors may also require significant capital increases for individual large organizations based on perceived risks discovered during bank examinations.¹ The finding that the largest organizations as a whole significantly exceed the well capitalized level for all three regulatory ratios is consistent with supervisors playing important roles, as market participants are less likely to focus attention on these three exact ratios.

Another set of hypotheses is that the large organizations may choose to hold such large buffers above the regulatory minimums to protect against unexpected events. These may be unfavorable events, such as large loan losses that might otherwise reduce capital below the minimums and result in sanctions under the

¹ For convenience, we often use the term “bank” to cover both independent banks and BHCs, we use the term “examinations” to cover both bank examinations and BHC inspections.

PCA rules. This may be particularly important for banking organizations with high earnings volatility, as discussed in prior research (e.g., Flannery 1991). It may be very costly to fall below the minimums because capital may be expensive to raise at such times, and some profitable lending opportunities may have to be foregone.

Banks may also want to hold extra capital in the event of unexpected favorable investment or growth opportunities. These may be bank acquisition opportunities or expansions into nonbank activities that require significant investments. Alternatively, these opportunities may be chances to expand organically by entering profitable new geographic markets. Internal funding through accumulated capital from retained earnings is generally the cheapest form of financing according to pecking order theory (e.g., Myers and Majluf 1984).

Market participants may also require significant capital cushions to protect their interests. Shareholders of profitable financial institutions may wish to keep capital high to protect the franchise value of their expected future earnings. Alternatively, more profitable banking organizations may choose lower capital because higher expected profitability serves as an alternative bulwark to capital against bank risk.² Debt holders of the banks may demand high capital to protect against the costs of financial distress and bankruptcy, imposing market discipline by requiring relatively high interest rates or withholding funds when banks do not have capital ratios commensurate with the riskiness of the bank. For banks, the costs of financial distress include the mandatory and discretionary supervisory sanctions of the PCA rules, as well as any other supervisory penalties not specified in these rules. In addition, firms receiving bank credit may also wish to do business with strong financial institutions to protect against loss of credit availability in the event of significant bank losses that erode capital and require credit rationing.

Agency costs among market participants and managers may also influence capital ratios. A low equity/asset ratio may mitigate agency problems between shareholders and professional managers that might be maximizing their own utility, rather than shareholder value (e.g., Jensen and Meckling 1976). However, very low capital may aggravate conflicts between shareholders and creditors over shareholders' incentives to risk-shift or reduce efforts to control and manage risks. Thus, the effect of equity/asset ratios on total agency costs may be nonmonotonic. At high capital ratios, reductions will produce favorable incentives for managers and reduce total agency costs. However, at some point where bankruptcy and distress become more likely,

² Note that I we should also look at the Milne 2004 paper .

the agency costs of outside debt overwhelm the agency costs of outside equity, so further decreases in the equity ratio result in higher total agency costs. A recent study of agency costs in banking finds that the negative effect of equity ratios on managerial agency costs dominates over the range of ratios observed for U.S. banks (Berger and Bonaccorsi di Patti 2006). This result suggests that on net, agency costs among managers, outside owners, and debt holders likely result in lower equity ratios than would otherwise be the case.

In general, it may be difficult to disentangle the actions of bank supervisors from those of market participants. Research suggests that both groups tend to act on similar information, including the results of nominally confidential bank examination outcomes (e.g., Cole and Gunther 1998, Berger, Davies, and Flannery 2000, DeYoung, Flannery, Lang, and Sorescu 2001). Notably, the examination information is not directly part of the regulatory capital ratios or the simple equity to assets ratio.

This raises the more general concern over whether the observed buffers over the regulatory capital minimums may be large because supervisors and/or market participants are using different risk measures than the regulatory capital denominators to determine capital adequacy. Thus, an additional hypothesis of why large U.S. banking organizations may hold high capital ratios is because these institutions are considered to be much riskier than implied by the regulatory ratios or the simple equity to assets ratio. Supervisors and/or market participants may simply require extra capital at these banks to compensate for these risks. The risks may include not only those discovered during examinations, but also off-balance sheet risks, trading risks, and risks from special functions, such as credit card, payments, or other operations (e.g., DeYoung and Roland 2001, Lang, Mester, and Vermilyea 2006).

Finally, at least in the short term, it may be relatively difficult to adjust capital downward rapidly, which may explain in part why high capital ratios, once obtained, are maintained for several years. Research suggests that bank earnings have a strong positive effect on capital ratios through retained earnings (Berger 1995). As shown below, large banks had very strong returns on equity (ROEs) for a number of years, which would require actions to keep high capital ratios from rising even further. It may be difficult to raise dividends, engage in stock buybacks, or other actions to reduce capital because such actions may be inhibited by supervisors. Such transactions may also send unfavorable signals to market participants about a bank's ability to invest the funds profitably.

Econometric tests of these hypotheses are complicated by several significant difficulties. First, all of the hypotheses may be true to some extent, as well as hypotheses for why bank capital may be lower than expected. At best, we can only measure net effects of the many hypotheses, and try to determine which appear to be most important. [ALLEN: I take your point, but I think this statement is too broad. Couldn't we, depending on the specification of our tests, convincingly *reject* some or many of these hypotheses?]

Second, as suggested above, bank earnings may be an important driving force behind capital accumulation, but earnings are also likely to be endogenous. Our capital dependent variable is likely to have a positive feedback effect on earnings when capital is below its "optimal" level due to historical accident and adjustment costs and a negative effect when capital is above its optimum. Prior research dealt with this issue using a VAR methodology (e.g., Berger 1995).

Third, another key set of variables affecting the choice of bank capital are those measuring bank risk. A number of hypotheses depend on risk, which is difficult to measure and is likely to be endogenous because banks with more capital may choose to take on more portfolio risk and their supervisors may allow this behavior. To deal with this, see Flannery and Rangan 2004???.³

Finally, actual bank capital will differ from desired bank capital, and most of the hypotheses are about desired capital. The deviation comes about because adjustment costs may be high, as alluded to above regarding the effects of earnings on capital. Moreover, these costs are likely to be asymmetric and nonmonotonic. For example, when bank capital is high and earnings are high, it may be easier to raise capital than to lower it by simply using retained earnings and a constant dividend policy. However, when capital and earnings are low, it may be much more costly to raise capital than to lower it because of the expense of issuing new securities when risks are relatively high and supervisory restrictions on reducing capital further. For discussion of adjustment costs, see Flannery and Rangan (2006).⁴

In the remainder of this preliminary document, we provide a brief history of U.S. bank capital requirements in Section 2, and document the evolution of aggregate bank capital ratios over time in Section 3. In future drafts, Section 4 presents our main hypotheses, which are not mutually exclusive – any or all of them may explain part of the equity buffers held by the large institutions. Section 5 describes the data set

³ **Mark, I assume you will take care of this one.**

⁴ **Mark, This one is for you also.**

used to test these hypotheses – primarily time series-cross section information on the largest U.S. banking organizations over the interval xxxx – xxxx drawn from the Y-9C files on consolidated bank holding companies.⁵ Section 6 outlines our econometric methodology, and Section 7 gives our main empirical results. Section 8 concludes.

2. Bank Capital Requirements, Past and Present

For as long as banks have been supervised, there have been informal capital requirements. Supervisors require banks to keep their equity capital ratios at some minimal level to protect depositors, other stakeholders, and the government safety net against losses. For large institutions and those with special roles in the payments system, additional capital may be also mandated to keep systemic risks under control. Formal capital regulations are minimums that apply to all institutions, whether or not supervisors deem them to be risky. Supervisors may always insist on capital above these minimums for individual institutions that are perceived to pose significant risks.

Formal capital regulation has not always been consistent across the different regulatory agencies. In the 1950s, the Federal Reserve alone adopted the ‘Analyzing Bank Capital’ (ABC) approach to capital adequacy. These guidelines required banks to hold different amounts of capital depending on the riskiness and liquidity of their assets and therefore was very similar in spirit to the Basel I risk-based guidelines that came much later. For instance, in both regimes, no capital was required to be held against short-term government securities. The ABC requirements were dropped by the Federal Reserve in the mid-1970s, after which U.S. bank capital requirements depended largely on the judgment and discretion of the banks’ supervisors.

In 1981, new standards were adopted by the three main federal bank regulators that required that banks hold capital equal to a fixed percentage of their on-balance sheet assets. The flat-rate standards initially allowed larger banks to hold less capital than smaller institutions based on the superior diversification of the large banks, but the standards were equalized in 1985. As of 1985, banks were required to have primary capital to total assets ratios of at least 5.5% and total primary plus secondary capital to total assets ratios of at least 6.0%. Primary capital includes common equity, loan loss reserves, and some convertible debt and preferred stock, and secondary capital includes subordinated debt and remaining preferred stock.

⁵ As will become apparent from the data in Section 3, we need to go back at least to the early 1990s.

There were several problems with the flat-rate standards. First, there were no capital requirements for off-balance sheet activities, such as standby letters of credit, loan commitments, or derivative contracts. The differential treatment of on- and off-balance sheet activities helped encourage banks to shift some activities off of their balance sheets. Second, all on-balance sheet assets were treated equally, which likely encouraged some banks to shift from relatively safe assets such as U.S. treasuries, into riskier assets, such as commercial loans. Third, foreign banks were not subject to these rules, so they benefited relative to their U.S. competitors.

The Basel 1 risk-based capital standards, which were agreed upon in 1988, provided responses to these problems. The new guidelines required capital for off-balance sheet risks, ended the equal treatment of on-balance sheet assets with very different risk characteristics, and addressed the competitive inequities of foreign banks operating with different capital standards. The risk-based requirements were partially implemented as of December 1990 and fully implemented as of December 1992.

The standards are based on a risk-weighted assets (RWA) denominator, which focuses on credit risk, reflecting the perception that credit risk poses the most serious threat to bank solvency. To compose RWA, all assets and off-balance sheet instruments are assigned risk weights of 0%, 20%, 50%, or 100%, depending on the group to which the obligor belongs and the type of financial instrument. For example, all short-term treasuries are assigned a 0% weight and all commercial and industrial (C&I) loans are assigned a 100% weight.

The Basel Accord sets a 4% minimum standard for Tier 1 capital and an 8% standard for Total Tier 1 plus Tier 2 capital. Tier 1 capital includes mainly equity – common stockholder's equity; qualifying noncumulative perpetual preferred stock (including related surplus); minority interest in equity accounts of consolidated subsidiaries; less goodwill (e.g., purchased mortgage servicing and purchased credit card relationships, other intangible assets). Tier 2 capital includes the allowance for loan and lease losses up to 1.25% of RWA, term subordinated debt and intermediate-term preferred stock up to 50% of Tier 1 capital; other hybrid and debt securities, and limited unrealized gains on equity securities.

Although the initial Basel Accord states that it is to be applied to all internationally-active banks, the U.S. risk-based capital guidelines apply to all banks, as well as all BHCs over \$150 million. Essentially, the same standards apply to BHCs as to banks, except that BHCs are able to count some additional equity and

debt instruments as Tier 1 and Tier 2 capital. For instance, Tier 1 capital for BHCs may also include a minority interest related to qualifying common or noncumulative perpetual preferred stock directly issued by a bank subsidiary. Since initial adoption, there have been a number of revisions to Basel I as applied to U.S. institutions. The most significant revision was adoption of the 1996 amendment to address the market risk exposure of institutions, particularly those with large trading portfolios. The Basel I standards essentially remain in effect today, although some large banking organizations will be under the Basel II standards in the coming years.

Two other significant changes also occurred during the 1990 to 1992 implementation period for Basel I. First, it was recognized that the risk-based capital standards do not account for some obvious determinants of credit risk, such as differences in credit quality across C&I loans, all of which are in the 100% category; concentrations of risk to a particular counterparty, industry, region, or nation; or covariances among the values of financial instruments. As well, other types of risk were not directly addressed. In order to capture risks that might be missed by risk-based capital and place a positive floor under bank capital, U.S. regulators in 1990 added a leverage requirement, effective in 1991, which mandated that banks hold Tier 1 capital of at least 3% against unweighted assets, with the amount above 3% depending upon examination ratings and the discretion of the supervisor. Only banks with the highest examination rating and not experiencing or anticipating significant growth, are allowed to have a leverage ratio of 3%. All others are expected to maintain a minimum leverage ratio of at least 4%.

Second, legislators were concerned that there might be too much discretion in the supervisory enforcement of the standards and the closure of capital-impaired banks. Therefore, the prompt corrective action (PCA) portion of the FDIC Improvement Act of 1991 (FDICIA) required that banks with capital ratios below certain threshold values be subject to specific mandatory and discretionary sanctions. Banks are classified as either:

- 1) Well capitalized – Total risk-based ratio $\geq 10\%$, Tier 1 risk-based ratio $\geq 6\%$, and Tier 1 leverage ratio $\geq 5\%$;
- 2) Adequately capitalized – Total $\geq 8\%$, Tier 1 $\geq 4\%$, leverage ratio $\geq 4\%$, and not qualified as well capitalized;
- 3) Undercapitalized – Total $< 8\%$, Tier 1 $< 4\%$, or leverage ratio $< 4\%$, and not qualified for

lower categories;

4) Significantly undercapitalized – Total < 6%, or Tier 1 < 3%, or leverage ratio < 3%, and not qualified for lowest category; or

5) Critically undercapitalized – tangible equity/total assets < 2%.

Under PCA, well capitalized and adequately capitalized institutions are prohibited from actions that would leave them undercapitalized. The mandatory and discretionary actions are increasingly harsh as banks fall further below the adequately capitalized category. For example, an undercapitalized bank is subject to mandatory increased monitoring, must submit and implement a capital plan within 45 days, has its asset growth restricted, and needs prior supervisory approval for new acquisitions, branches, or lines of business. Further discretionary actions include possible replacements of management or divestiture or sale of the institution.

Importantly, while there are no explicit differences in regulatory treatment between organizations that are measured as well capitalized versus those measured to be adequately capitalized, it is quite possible that there are supervisory differences. As suggested above, one reason why large banking organizations in the U.S. tend to have so much equity may be to assuage supervisors. This may be a widespread phenomenon in which supervisors generally require higher capital for large organizations to protect the safety and soundness of the financial system, or may be targeted at a limited number of institutions deemed to pose significant risks. Our empirical analysis below distinguishes between these alternatives by examining the portion of large institutions that hold capital well in excess of regulatory minimums.

3. U.S. Bank Capital Ratios over Time

The actual capital ratios of banks are determined by market forces as well as the regulatory and supervisory factors. This section provides a brief overview of aggregate U.S. bank capital over time to illustrate some of these effects. Figure 1 shows the ratio of the book value of equity to the book value of assets for the U.S. banking industry from 1840 to 2006. The data sources and series are not fully consistent over time, but they give a general idea of the effects of major changes in the industry over time.⁶

The figure shows a dramatic decline in capital over time, from equity financing over 50% of assets in

⁶ Earlier versions of this figure appeared in U.S. Treasury (1991, developed by Myron Kwast), and in Berger, Herring, and Szego (1995).

1840 down to about 5% to 6% from the mid-1970s through the 1980s. This significant decline over time is almost surely due to two main factors – 1) reduced risks of banks, and 2) increased government safety net protections – both of which reduce the amount of capital that the market requires to protect stakeholders from the risks of bank failure or financial distress.

Early in the time period shown, banks increasingly used clearinghouses and mutual guarantee associations to reduce their probability of failure, lessening the amount of capital needed to protect creditors, shareholders, and managers. Over time, banks also expanded geographically and across industries, helping to diversify their risks, and providing an alternative to high capital ratios to protect against failure and distress.

The figure also shows several regulatory events. The National Banking Act of 1863 required the new national banks to collateralize their currency issues with U.S. government bonds, increasing the safety of the notes and the banks, and further reducing capital required by the market. The creation of the Federal Reserve in 1914 reduced the expected costs of financial distress by permitting banks to obtain liquidity through discounting assets at the Reserve banks, rather than incurring losses from the distressed sale of assets. The Federal Reserve also provided a more reliable system for clearing checks at par, reducing payments risks. Despite these reductions in the expected costs of financial distress, the data suggest that the creation of the Federal Reserve led to, at most, a small reduction in capital ratios. The creation of the FDIC in 1933 provided unconditional government guarantees for most bank depositors – the main creditors of most banks – and likely had significant effects in reducing capital from about 15% to about the 6% - 8% range, where it stayed for many years. The introduction of formal flat-rate capital requirements in 1981, later modified to raise standards for large banks in 1985, appears to have had relatively little effect in increasing overall industry capital. The industry capital ratio was at 6.4% entering the 1990s.

The data in the figure show a dramatic rise in capital starting in the early 1990s, bringing the ratio to about 10.1% in 2006. Most of the increase is at the large banking organizations, which have the lion's shares of both industry equity and assets. There are a number of possible explanations of this increase – which is the main subject of our paper – but several explanations suggest themselves. First, as shown in the figure, the combination of regulatory events in the 1990 - 1992 interval – implementation of the Basel I Risk-Based Capital requirements, new leverage requirements, and Prompt Corrective Action rules – may have resulted in significantly more capital raised by banks during this period. The impact was likely highest for the largest

banks, which suffered the greatest increase in capital requirements under the Basel Accord due to the inclusion of off-balance sheet items for the first time in capital requirements. One study shows that ratio of equity to gross total assets (GTA, which includes allocations for loan and lease losses) rose by 1.8 percentage points from 5.2% to 7.0 for banks with over \$100 billion in GTA (real 1994 dollars) from the end of 1989 to the end of 1992, while the industry ratio rose by only 1.3 percentage points from 6.1% to 7.4% (Berger, Kashyap, and Scalise 1995). Some research on the credit crunch of the early 1990s is also consistent with the notion that these capital regulations were effective. These studies find that the increases in capital requirements caused banks to reduce lending, although it is difficult to disentangle the effects of the individual regulatory changes (e.g., Berger and Udell 1994, Peek and Rosengren 1995a, Hancock, Laing, and Wilcox 1995, Shrieves and Dahl 1995). The reduction in lending reduces the assets in the denominator of the equity-to-assets ratio, but presumably these institutions also increased the numerator equity in response as well. However, regulation does not seem likely to explain the continuing rise in capital into the late 1990s and 2000s.

There may have also been an increase in supervisory toughness in the late 1980s - early 1990s, as bank failures and losses from commercial real estate lending became apparent. That is, supervisors may have required that banks have more capital for a given measured bank condition. Some research confirms this increase in toughness – supervisors assigned worse examination ratings, increased classified assets, and engaged in more enforcement actions for a given measured bank condition than in prior years (e.g., Bizer 1993, Peek and Rosengren 1995b, Berger, Kyle, and Scalise 2001, Curry, Fissel, and Ramirez 2006). The increases in toughness during examinations may cause either an increase or decrease in measured equity ratios in the short term. In the very short term, equity may decline, as an increase in classified assets during examinations results in higher allocations for loan and lease losses, which directly decreases equity. In the long run, the higher supervisory capital requirements – if they are maintained – should result in higher capital, at least for banks considered to be problem institutions.

However, the extent to which supervisors remained tough and enforced generally high capital requirements thereafter is unknown. On the one hand, some research suggests that effects of toughness as measured through examination ratings and their effects on bank lending were significantly diminished after the early 1990s (e.g., Berger, Kyle, and Scalise 2001, Curry, Fissel, and Ramirez 2006). On the other hand,

the effects of recent enforcement actions – such as the Federal Reserve’s tightened risk management controls on Citigroup and J.P. Morgan Chase from 2003-2006 based on their roles in the Enron collapse – are unclear at present.

One likely explanation of the continuing increase in bank capital ratios after the early 1990s may be the historically high earnings of banks. Industry return on equity (ROE) was in the 12.5% to 15.5% range for every year starting in 1993, except for a slight drop to about 10.1% in 2006. As discussed above, banks may have relatively little discretion to reduce their capital ratios when high earnings raise them, potentially giving some momentum to the continuing increase in equity ratios. In our empirical analysis below, we test the effects of these and other hypotheses.

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