

**Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation:
Why Bank Equity is Not Socially Expensive**

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October 2013

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Abstract

We examine the pervasive view that “equity is expensive,” which leads to claims that high capital requirements are costly for society and would affect credit markets adversely. We find that arguments made to support this view are fallacious, irrelevant to the policy debate by confusing private and social costs, or very weak. For example, the return on equity contains a risk premium that *must* go down if banks have more equity. It is thus incorrect to assume that the required return on equity remains fixed as capital requirements increase. It is also incorrect to translate higher taxes paid by banks to a *social* cost. Policies that subsidize debt and indirectly penalize equity through taxes and implicit guarantees are distortive. And while debt’s informational insensitivity may provide valuable liquidity, increased capital (and reduced leverage) can *enhance* this benefit. Finally, suggestions that high leverage serves a necessary disciplining role are based on inadequate theory lacking empirical support.

We conclude that bank equity is *not* socially expensive, and that high leverage at the levels allowed, for example, by the Basel III agreement is not necessary for banks to perform *all* their socially valuable functions and likely makes banking inefficient. Better capitalized banks suffer fewer distortions in lending decisions and would perform better. The fact that banks choose high leverage does not imply that this is socially optimal. Except for government subsidies and viewed from an *ex ante* perspective, high leverage may not even be privately optimal for banks.

Setting equity requirements significantly higher than the levels currently proposed would entail large social benefits and minimal, if any, social costs. Approaches based on equity dominate alternatives, including contingent capital. To achieve better capitalization quickly and efficiently and prevent disruption to lending, regulators must actively control equity payouts and issuance. If remaining challenges are addressed, capital regulation can be a powerful tool for enhancing the role of banks in the economy.

Keywords: capital regulation, financial institutions, capital structure, “too big to fail,” systemic risk, bank equity, contingent capital, Basel, market discipline.

JEL classifications: G21, G28, G32, G38, H81, K23.

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1. Introduction

As the financial crisis of 2007-2008 has compellingly shown, highly indebted financial institutions create negative externalities that can greatly harm the economy and society. When a bank has little equity that can absorb losses, even a small decrease in asset value can lead to distress and potential insolvency. In a deeply interconnected financial system, this can cause the system to freeze, ultimately leading to severe repercussions for the rest of the economy.¹ To minimize social damage, governments may feel obliged to spend large amounts on bailouts and recovery efforts. If a small decrease in asset values compels highly-leveraged banks to sell substantial amounts of assets in order to reduce their leverage, such sales can put strong pressure on asset markets and prices and, thereby indirectly weaken other banks.

Avoidance of such “systemic risk” and the associated social costs is a major objective of financial regulation. Because market participants, acting in their own interests, tend to pay too little attention to systemic concerns, financial regulation and supervision are intended to safeguard the functioning of the financial system. Given the experience of the recent crisis, it is natural to consider a requirement that banks have significantly less leverage and use more equity funding so that inevitable variations in asset values do not lead to distress and insolvency.

A pervasive view that underlies most discussions of capital regulation is that “equity is expensive,” and that equity requirements, while offering substantial benefits in preventing crises, also impose costs on the financial system and possibly on the economy. Bankers have mounted a campaign against increasing equity requirements. Policymakers and regulators are particularly concerned by assertions that increased equity requirements would restrict bank lending and impede economic growth. Possibly as a result of such pressure, the proposed Basel III requirements, while moving in the direction of increasing capital requirements, still allow banks to remain very highly leveraged.² We consider this very troubling, because, as we show below, the view that equity is expensive is flawed in the context of capital regulation. *From society’s perspective, in fact, having a fragile financial system in which banks and other financial institutions are funded with too little equity is inefficient and indeed “expensive.”*

We will examine various arguments that are made to support the notion that there are social costs, and not just benefits, associated with increased equity requirements. Our conclusion is that the social costs of *significantly* increasing equity requirements for large financial institutions would be, if there were any at all, very small. All the arguments we have encountered that suggest otherwise are very weak when examined from first principles and in the context of optimal regulation. They are based either on fallacious claims, on a confusion between private

¹ Similar observations are made, for example, Adrian and Shin (2010) and Adrian and Brunnermeier (2010).

² The proposed requirements set minimal levels for Core Capital at 7 % (including a 2.5 % anti-cyclical buffer) and for Tier 1 Capital at 8.5 % of “risk weighted” assets, up from 2.5% and 4 %, respectively. Tier 1 Capital includes certain kinds of subordinated debt with infinite maturities; Tier 2 Capital even includes certain kinds of debt with *finite* maturities. In assessing these numbers, one has to bear in mind that risk-weighted assets usually are a fraction of total assets, for some banks as low as one tenth – and that, in the crisis, some assets that had *zero* risk weights induced losses exceeding the bank’s equity. The proposed “leverage ratio” regulation involves a requirement that equity must be at least 3 % of un-weighted total assets.

costs to banks (or their shareholders) and social costs to the public, or on models that are inadequate from both a theoretical and an empirical perspective.

The discussion is often clouded by confusion between capital requirements and liquidity or reserve requirements. This confusion has resulted in routine references in the press to capital as something banks must “set aside” or “hold in reserve.” Capital requirements refer to how banks are *funded* and in particular the mix between debt and equity on the balance sheet of the banks. *There is no sense in which capital is idly “set aside” by the banks.* Liquidity or reserve requirements relate to the type of assets and asset mix banks must hold. Since they address different sides of the balance sheet, there is no immediate relation between liquidity or reserve requirements and capital requirements. However, if there is more equity and less debt on the balance sheet, liquidity concerns may not be as acute, because creditors have relatively fewer claims and the probability of insolvency is smaller; hence, a run by creditors is less of a problem to be concerned about. High equity can therefore alleviate concerns about liquidity. The discussion that follows is focused on capital, and, more specifically, equity requirements.³

We begin by showing that equity requirements need not interfere with any of the socially valuable activities of banks, including lending, deposit taking, or the creation of “money-like,” liquid, and “informationally-insensitive” securities that might be useful in transactions. In fact, the ability to provide social value would generally be *enhanced* by increased equity requirements, because banks would be likely to make more *economically appropriate* decisions. Among other things, better capitalized banks are less inclined to make excessively risky investments that benefit shareholders and managers at the expense of debtholders or the government. In addition, the debt issued by better capitalized banks is safer and generally less “informationally sensitive” and thus potentially more useful in providing liquidity.

Whereas equity, because it is riskier, has a higher required return than debt, it does not follow that the use of more equity in the funding mix increases the overall funding cost of banks. Using more equity in the mix lowers the riskiness of the equity (and perhaps also of debt or other securities that are used in the mix). Unless securities are mispriced, simply rearranging how risk is borne by different investors does not by itself affect funding costs. These observations constitute some of the most basic insights in corporate finance.⁴

The funding costs of all firms, including banks, do depend on the funding mix as a result of various frictions and distortions. Some of the most important frictions and distortions are actually created by public policy. For example, most tax systems give an advantage to debt and penalize equity financing. Therefore, banks’ funding costs may increase if they are required to reduce their reliance on subsidized debt financing. From a public policy perspective these arguments are wrong since they inappropriately focus on private costs to the bank rather than social costs. Since

³ As mentioned in fn. 2, regulatory capital includes some securities that are hybrid or even just subordinated debt. In this paper, we do not dwell on these differences. In our view, capital regulation should focus on equity.

⁴ Yet, numerous statements in the policy debate on this subject fail to take them into account and therefore are based on faulty logic. Thus, in many studies of the impact of increased equity requirements, including, for example, BIS (2010a), the required return on equity is taken to be a constant number; yet this required return *must* go down if banks have more equity. While the fact that the required return would fall is mentioned in the text of BIS (2010a), the empirical analysis still assumes a constant required return on equity, and this rate is also used inappropriately in other parts of the study. The study by IIF also suffers from such shortcomings.

banks use more debt than other companies, they already benefit more heavily from tax subsidies, but in any case, there is no automatic social cost to banks paying more taxes.

Ideally, taxes should be structured to minimize the overall distortions they induce, encourage behavior that generates positive externalities and discourage behavior that generates negative externalities. A tax system that encourages banks to take on socially costly excessive leverage is highly distortionary and dysfunctional. The distorting effects of taxes could be neutralized by untying the tax bill of the banks from their actual leverage, so as to avoid creating a wedge between what is privately beneficial for the banks and what is good for society. Even if banks pay more taxes, the effect on their funding costs or on the cost of the loans is quite minimal.⁵

Implicit government guarantees and underpriced explicit guarantees constitute another distortion that favors debt over equity financing for financial institutions. A subsidized “safety net” leads to the danger of the “privatization of profits and socialization of costs.” Banks benefit from the subsidized safety net by being able to borrow more cheaply and with fewer restrictions and covenants than they otherwise would. Although politicians are fond of saying that bailouts should *never* happen, it is impossible, and not even desirable, for governments to *commit* to never bail out a financial institution. It is extremely difficult to charge banks for the value subsidy this creates, but even if the direct cost of the subsidy is covered, the inefficiency and collateral damage associated with excessive leverage remain, including incentives to take excessive risk, to underinvest in some worthy loans or other investments, and to choose excessively high leverage. Requiring banks to have significantly more equity so as to lower the social cost associated with any implicit (or underpriced) guarantees and to reduce the inefficiency of high leverage is highly beneficial and corrects the distortions. Even more so than in the context of taxes, it is perverse for public policy to provide blanket subsidies to bank borrowing and thus encourage harmful behavior when banks respond by choosing excessive and harmful levels of leverage.

Some have argued that higher equity capital requirements would be costly because debt helps in addressing governance problems by “disciplining” managers. For example the fear that deposits or short-term debt might be withdrawn (or not renewed) is said to lead managers to act more in line with the preferences of creditors and other investors in the bank. However, the theoretical and empirical foundations of these claims are very weak, and the models used to support them are inadequate for guiding policy. In fact, leverage *creates* significant frictions and governance problems that distort the lending and investment decisions of financial institutions as well as their subsequent funding decisions that show quite the opposite of “discipline.” These frictions are exacerbated in the presence of implicit guarantees, which also blunt any potential monitoring on the part of creditors by removing their incentives to monitor. The events of the recent financial crisis also appear to contradict the notion that debt helps provide *ex ante* discipline to bank managers. Finally, even if debt *can* play a positive role in governance, there are alternative ways to address governance problems that do not rely on socially costly excessive leverage.

Another argument against higher equity capital requirements is based on the claim that equity is costly for banks to issue if investors interpret the decision to issue equity as a negative signal. These considerations are not valid reasons for not requiring banks to have significantly more

⁵ See Hanson, Kashyap and Stein (2010).

equity. In fact, the idea that information asymmetries between managers and investors give rise to a reluctance to issue equity is taken to imply a “pecking order theory” of capital structure where it is distinctly *not* the case that “equity is expensive.” In fact, in the pecking order of funding, which has some empirical support, *retained earnings* are the preferred source of funding, followed by external debt and lastly external equity. By retaining earnings a firm increases its equity relative to what it would be if the earnings were paid out and debt issued instead. Thus the most preferred form of funding by firms facing problems due to asymmetric information is equity funding.

In the context of regulation, in fact, the negative signal that might be associated with equity issuance can be reduced or removed if banks have less discretion. Regulators can impose specific schedules for equity issuance so as to remove any information content from such issuance. In fact, better capitalized banks need less external finance, as they have more retained earnings with which to fund their growth. Third, better capitalized banks incur proportionately lower costs when issuing additional equity. Finally, because higher equity goes along with a lower default risk, it also enhances the liquidity of debt securities issued by the bank. Higher equity need not interfere with the use of collateral in trading.

Since banks are actually highly leveraged, there is a temptation to conclude that such high leverage must be the optimal solution to some problem banks face. This inference is invalid. As we show in Admati et al. (2013), debt overhang and a leverage ratchet effect, combined with government guarantees and subsidies of debt, actually lead banks to choose a *highly inefficient* funding mix that, aside from the subsidies, likely reduces the total value of the banks to investors as well as socially.⁶ Excessively high leverage appears to be the result of banks’ inability to make commitments regarding future investments and financing decisions. That is, given continual incentives to increase leverage and shorten its maturity to usurp prior creditors, banks’ capital structures, as they evolve over time, involve leverage that is excessive even from the narrow perspective of what is good for the bank and its shareholders and other investors. Capital regulation is particularly beneficial in this context, effectively allowing banks to commit to a less inefficient funding mix. All of this produces what can be called a “leverage ratchet effect,” which we explore in Admati et al. (2013).

How would significantly higher equity capital requirements affect the lending activities of banks? We argue that, since highly leveraged banks are subject to distortions in their lending decisions, better capitalized banks are likely to make *better* lending decisions. In particular, they will have less incentive to take on excessive risks and will be subject to fewer problems related to “debt overhang” that can actually prevent them from making valuable loans. There is indeed no reason for better capitalized banks to refrain from any socially valuable activity, since these activities would not become more costly once any required subsidies are set at an appropriate level. Thus, there is no reason to believe that, if overall public policy forces banks to operate with significantly higher and safer equity levels and if any subsidies are set in a socially responsible way, banks would refrain from making loans that would lead to growth and prosperity. Highly leveraged banks might respond to increased capital requirements by restricting loans because of the “debt overhang” problem mentioned above, but this will be

⁶ Consistent with this, Mehran and Thakor (2010) find that various measures of bank value are positively correlated with bank capitalization in the cross section. Berger and Bouwman (2010) show that higher bank capital is important in banks’ ability to survive financial crises.

alleviated once banks are better capitalized. In the transition, regulators can forbid equity payouts and possibly mandate equity issuance to make sure this does not happen. Additional equity also enhances the bank's ability to provide money-like securities that investors may value, since such securities become even less risky and more "informationally insensitive" when they are backed by additional equity.

We show that adding equity to banks' balance sheets need not have any negative effect on the aggregate production activities or asset holdings in the economy. We also show that it need not interfere with the creation of informationally-insensitive securities that are easy to liquidate. If additional equity is used by banks to buy marketable securities, this does not affect the undertaking of productive activities in the economy or the portfolios of final investors. If the banks buy securities that are liquid, the liquidity of the bank's assets will be enhanced, which is a potential additional benefit.

A clear recommendation that emerges from our analysis is that prohibiting, for a period of time, dividend and other equity payouts for all banks is a prudent and efficient way to have banks build up capital. If done under the force of regulation in a uniform manner, these payout suspensions would not lead to any negative inference on the health of any particular bank. In addition, as mentioned above, in transitioning to higher equity requirements, regulators should also require banks to issue specific amounts of equity on a pre-specified schedule. If a bank cannot raise equity at any price, it may be insolvent or nonviable without subsidies, in which case it should be unwound.

In the post-crisis debate about banking regulation, it is sometimes claimed that higher capital requirements would move important activities from the regulated parts of the financial system to the unregulated parts, the so-called *shadow banking system*, where leverage often is even higher than in the regulated banking system. However, most of the highly leveraged institutions in the shadow banking system were not independent units but were conduits and structured-investment vehicles that had been created and guaranteed by financial institutions in the regulated sector. The sponsoring banks used these devices to evade the regulations to which they were subject. This "regulatory arbitrage," accomplished through money market funds that operated like banks but were not regulated like banks, succeeded because bank regulators and supervisors allowed it.⁷ Supervisors should have insisted on proper accounting and risk management for the risks inherent in the guarantees that regulated banks had given to their shadow banking subsidiaries. Put simply, the dangerous parts of the shadow banking system are evidence of failed enforcement of regulation and do not constitute a valid argument against regulation.⁸

Our discussion focuses on the social costs and benefits of banks using more *common equity* as a way to fund banks. Other types of securities that might be issued by banks are far less effective in providing a reliable cushion. Indeed, the recent crisis has shown that Tier 2 capital, i.e., subordinated or hybrid forms of debt, does not provide a reliable cushion. Proposals have been made to substitute "contingent capital," i.e., a debt-like security that converts to equity

⁷ Acharya and Richardson (2009), Acharya, Schnabl, Suarez (2013), Hellwig (2009b), Turner (2010).

⁸ See also the discussion in Admati and Hellwig (2013, Chapter 13) on the "shadow banking bugbear." It is interesting to note that, in the recent crisis, those parts of the shadow banking systems which were not related to regulated banks sponsoring them, e.g. independent hedge funds, did not experience problems that turned into systemic risks. Ang, Gorovyy, and Inwegen (2011) study hedge fund leverage and show that it has generally been modest, and even through the recent financial crisis.

under some conditions, for subordinated debt to or using “bail-in” mechanisms to try to improve the cushion provided by Tier 2 capital.

While hybrid securities such as contingent capital and bail-in procedures have advantages over straight debt, these debt-like claims are dominated by equity for the purposes of the regulation. Contingent capital is complex to design and to value. Bail-in mechanisms place extraordinary demands on regulators in crisis situations and present many implementation issues. There is no compelling rationale for introducing either of these as “substitutes” for equity in capital regulation, when simple equity will provide a more reliable cushion and is best at reducing the debt overhang problem.

We do not address all the issues that regulators confront in regulating financial institutions. Our discussion applies most urgently to those institutions whose leverage imposes negative externalities on the financial system as a whole, i.e., “systemic risk” and which are “too important” or “too interconnected” to fail. A workable definition of such “systemic” institutions raises a host of additional questions, which go beyond the scope of this paper. Another issue we do not elaborate on here is the current use of risk weights to determine the size of asset base against which equity is measured. As discussed in Brealey (2006), Hellwig (2010), and Admati and Hellwig (2013), this system is complex, easily manipulable and it can lead to distortions in the lending and investment decisions of banks. Proposing a way to track the riskiness of banks’ assets on an ongoing basis is a challenge beyond the scope of the current paper.

There have been hundreds of papers on capital regulation in the last decade, and particularly since the financial crisis. Among papers that make similar or related observations to those we make here are Harrison (2004) and Brealey (2006), who also conclude that there are no compelling arguments supporting the claim that bank equity has a social cost.⁹ Poole (2009) identifies the tax subsidy of debt as distorting, a concern we share. However, he goes on to suggest that long-term debt (possibly of the “contingent capital” variety) can provide both a meaningful “cushion” and the so-called “market discipline.” As we explain especially in Sections 5.1 and 8, we take issue with this part of his assessment. Turner (2010) and Goodhart (2010) also argue that a significant increase in equity requirements is the most important step regulators should take at this point. Acharya, Mehran and Thakor (2011) and Goodhart et al. (2010) suggest, as we do, that regulators use restrictions on dividends and equity payouts as part of prudential capital regulation. We take this recommendation a step further by suggesting, similar to Hanson, Kashyap and Stein (2010), mandatory equity issuances as well, not just to control the actions of distressed institutions, but rather as a way to proactively help overcome informational frictions and avoid negative inferences associated with new issues. Such mandates are particularly important in managing a transition to a regime with significantly higher equity requirements. Finally, Kotlikoff (2010) proposes what he calls Limited Purpose Banking, in which financial intermediation is carried out through mutual fund structures. His proposal, like ours, is intended to reduce systemic risk and distortions, especially those associate with excessive risk taking. Our recommendations differs from his in that we allow for financial intermediation to be performed by the same type of structures that currently exist, i.e., intermediaries that can make loans, take deposits and issue other “money-like” claims.

⁹ Many authors, including King (1990), Schaefer (1990), Berger, Herring and Szegö (1995), Miller (1995), Brealey (2006), Hellwig (2009b), and French et al. (2010), have emphasized that the Modigliani-Miller Theorem must be the starting point of any discussion of capital regulation.

The key conclusions of this paper are summarized in a letter signed by 20 academics, and further elaborated in Admati and Hellwig (2013a, 2013b, 2013c).¹⁰ The conclusions are reinforced, as discussed in Sections 4-7, by Admati et al. (2013). In that paper we explore the leverage ratchet effect, which explains the resistance of banks' managers and shareholders with respect to higher equity requirements and generally to all forms of leverage reduction once debt is in place. The analysis in Admati et al. (2013) considers in detail how shareholders would choose to reduce leverage (for example among selling assets, recapitalization or asset expansion) if forced to do so. The paper therefore has significant implications for both the dynamics of capital regulation and transition to higher equity levels.

2. The Benefits of Increased Equity Requirements

Before examining the arguments that purport to show that increased capital requirements are costly, it is important to review some of the significant benefits associated with better capitalized banks. The recent financial crisis, as well as ones that have preceded it, have made it very clear that systemic risk in the financial sector is a great concern. Financial distress in one large institution can rapidly spill over into others and cause a credit crunch or an asset price implosion. The effects of systemic risk events such as the one just experienced are not confined to the financial sector of the economy. As history has repeatedly demonstrated, these events can have extremely adverse consequences for the rest of the economy and can cause or deepen recessions or depressions. Lowering the risk of financial distress among those institutions that can originate and transmit systemic risk produces a clear social benefit.¹¹

An obvious way to lower systemic risk is to require banks to fund themselves with significantly more equity than they did before the last crisis unfolded.¹² In the buildup to the last crisis important parts of the financial sector had become very highly leveraged. Indeed, several banks had balance sheets in which equity was only two or three percent of assets.¹³ Such a thin

¹⁰ See "Healthy Banking System is the Goal, Not Profitable Banks," *Financial Times*, November 9, 2010. Among the signatories are John Cochrane, Eugene Fama, Charles Goodhart, Stephen Ross, and William Sharpe. The text and links to other commentary are available at <http://www.gsb.stanford.edu/news/research/admatiopen.html>.

¹¹ Indeed, BIS (2010a) estimates that a 2% increase in capital ratios will reduce the probability of a financial crisis by 2.9%. The Bank of Canada (2010) estimates the gains that this would produce for the Canadian economy alone as equivalent to an annual benefit on the order of 2% of GDP.

¹² It is interesting to note that banks in the U.S. and in the U.K. were not always as highly leveraged as they have been in recent decades. According to Berger, Herring and Szegö (1995), in 1840 equity accounted for over 50% of bank total value, and the increase in leverage can be traced to additional measures to create a "safety net" for banks. Moreover, until the establishment of the FDIC in 1944, the equity issued by banks was not the limited-liability equity we have today. Instead, bank equity had double, triple and sometimes unlimited liability, which meant that equity holders had to cover losses and pay back debt even after losing the entire amount they invested. Alessandri and Haldane (2009) shows a similar pattern of increasing leverage in the U.K. For Germany, a similar increase in leverage is documented by Holtfrerich (1981); not surprisingly, however, the evolution here mirrors historical discontinuities associated with the two World Wars and the inflation of 1914-1923, as well as the long-term trend which set in long before 1914.

¹³ Of course, banks appeared to be better capitalized in percentage terms when their capital was measured relative to "risk weighted assets." The risk weightings used in these measures are highly problematic. Banks have exploited the freedom given them by the risk-calibrated approach to determining capital requirements and have used this freedom to dramatically expand the activities supported by the equity they had and in doing so increase leverage. Many of the

cushion obviously leaves little room for error. Even a moderate shock that reduces asset values by one or two percent puts such thinly capitalized banks on the brink of insolvency. Even if a bank is not actually insolvent, suspicions of its exposure to losses may stop other institutions from providing the short-term funding that it critically relies on. In the last crisis, even before the breakdown of Lehman Brothers, there were several instances during which interbank markets froze because of such distrust among market participants. With greater capital cushions, there would be less risk of such systemic breakdowns from mutual distrust.

Another consideration concerns corrective measures that are taken when losses have occurred. If supervisors – or short-term creditors – are concerned with the bank’s capital ratio, then, following a reduction of capital through losses, the bank must either recapitalize or deleverage by selling assets. Deleveraging puts pressure on asset markets, inducing prices to fall, with negative repercussions for other market participants, who also have these assets on their books. The extent of deleveraging depends on what the bank’s capital position is. If bank capital is 3% of the balance sheet, then following a loss of 1 million dollars, the bank attempting to deleverage must liquidate more than 33 million dollars of assets just to re-establish that 3% ratio. The systemic repercussions on asset prices and on other institutions will be accordingly large. Capital requirements based on higher equity ratios would dampen this effect – e.g. a 12.5% capital ratio would necessitate only an 8x response per dollar of losses – and thus reduce the likelihood and severity of systemic chain reactions.

By the same argument, capital requirements based on higher equity ratios would also dampen the adverse effects of shocks and losses on bank lending. In the debate on capital requirements, some maintain that high capital requirements would harm lending. Yet the sharpest downturn in lending in living memory occurred in the fourth quarter of 2008 – *not* because of stringent capital requirements, but because of losses incurred in the crisis and there was an insufficient capacity to absorb those losses. Higher bank capital requirements provide for a smoothing of banks’ lending capacity, which is altogether beneficial even though at some moments, the requirement may be seen as temporarily constraining. They also provide regulators with greater latitude toward forbearance in times of crisis, as banks who do experience capital shortfalls are still likely to be far from insolvency.

If governments see the need to avoid the social costs of systemic crises by stepping in to support their banking sectors, then an additional benefit of increased equity requirements comes from reducing the burden on taxpayers. This benefit is produced in two ways. First, increased equity requirements reduce the probability that bailouts will be necessary, since the equity cushion of the bank can absorb more substantial decreases in the asset value without triggering a default. Second, if a bailout does become necessary, the amount of required support would generally be lower with a larger equity cushion, since a larger portion of losses would be absorbed by the equity. Both the diminished probability of a systemic event and the decreased amount of support required in the event of a crisis significantly reduce the costs to taxpayers.

risks that materialized in the crisis, however, had not even been considered in assessing risk weights beforehand. Moreover, true leverage was often masked through accounting maneuvers, especially in connection with the so-called shadow banking system. On the shadow banking system, see Pozsar et al. (2010). On the use of the risk-calibrated approach to expand activities supported by a given level of equity, see Hellwig (2009b, 2010). Hellwig (2010) suggests that notions of measurement of risks that underlie the risk-calibrated approach are largely illusory.

There are additional benefits of higher equity capital requirements beyond the major ones just given. These are generally related to the reduction in conflicts of interest and the better alignment of incentives that are created with less leverage. In particular, more equity capital reduces the incentives of equity holders (and managers working on their behalf or compensated via equity-based measures) to undertake excessively risky investments. This will be discussed in more detail in Sections 4.2 and 5.1 below.

In the remainder of the paper we argue that the social costs of significantly higher equity requirements, if they exist, are minimal. Given the very large benefits associated with higher equity levels, the case for requiring much more equity is extremely strong. Many representatives of the banking community make strong assertions about the costs of bank equity requirements, while deemphasizing or paying lip service to the substantial benefits associated with the reduction of systemic risk that results from more equity funding of banks. Given the cost of the recent crisis to the global economy, such a debating stance is quite incredible. Policy recommendations regarding capital regulation must be based on an analysis that accounts as fully as possible for the social costs and benefits associated with any change in equity requirements.¹⁴

3. Capital Structure Fallacies

Capital requirements place constraints on the capital structure of the bank, i.e., on the way the bank funds its operations. Any change in a bank's capital structure changes the exposure of different securities to the riskiness of the bank's assets. In this section we take up statements and arguments that are based on confusing language and faulty logic regarding this process and its implications. The debate on capital regulation should not be based on misleading and fallacious statements, so it is important to make sure they are removed from the discussion.

3.1 What is Capital and What are Capital Requirements?

“Capital is the stable money banks sit on... Think of it as an expanded rainy day fund.” (“A piece-by-piece guide to new financial overhaul law,” *AP* July 21, 2010).

“Every dollar of capital is one less dollar working in the economy” (Steve Bartlett, Financial Services Roundtable, reported by Floyd Norris, “A Baby Step Toward Rules on Bank Risk,” *New York Times*, Sep. 17, 2010).

“The British Bankers' Association ... calculated that demands by international banking regulators in Basle that they bolster their capital will require the UK's banking industry to hold an extra £600bn of capital that might otherwise have

¹⁴While BIS (2010a) and Miles, Yang and Marcheggiano (2011) attempt to quantify the benefits as well as the costs of increased equity requirements, a recent NY Fed Staff Report (Angelini et al., 2011), entitled “BASEL III: Long-Term Impact on Economic Performance and Fluctuations,” focuses almost entirely on purported costs, while essentially ignoring the key benefits of increased equity requirements.

been deployed as loans to businesses or households.” *The Observer* (July 11, 2010)

Statement: “Capital represents money that banks must set aside and keep idle, and it cannot be used productively.”

Assessment: This statement and the quotes above are false and misleading. They confuse the two sides of the balance sheet. They portray capital as idle and thus costly. In fact, capital requirements address *how banks are funded*, not what assets they invest in or hold. They do *not* require setting aside funds and not investing them productively.

Equity simply represents an ownership claim in the form of common shares of stocks, such as those traded on stock markets. Equity is considered a “cushion” or a “buffer” because its holders do not have a hard claim against the issuer; if earnings turn out to be low or even negative, the bank can lower its payout to equity holders without any notion of default.

Until recently, bank capital regulation has also allowed securities other than common stock to be counted as “regulatory capital.” Most of these are hybrid securities that have some features of debt and some of equity. The typical hybrid security tends to involve a fixed claim, like debt, but this claim is subordinated to all other debt. Moreover, debt service on the hybrid security may be suspended when the bank makes a loss; under certain conditions even the principal may be written down. The new regulations imposed by Basel III focus much more on common equity. However, proposals for new forms of hybrid securities, so-called “contingent capital” are also being discussed. In Section 8, we consider hybrid securities and argue that they are inferior to common equity, which provides the most reliable buffer for preventing a crisis and because, as we argue below, equity is not expensive from a social perspective.

3.2 Equity Requirements and Balance Sheet Mechanics

“More equity might increase the stability of banks. At the same time however, it would restrict their ability to provide loans to the rest of the economy. This reduces growth and has negative effects for all.” Josef Ackermann, CEO of Deutsche Bank (November 20, 2009, interview).¹⁵

“[C]apital adequacy regulation can impose an important cost because it reduces the ability of banks to create liquidity by accepting deposits.” Van den Heuvel (2008, p. 299).

Statement: “Increased capital requirements force banks to operate at a suboptimal scale and to restrict valuable lending and/or deposit taking.”

Assessment: To the extent that this implies balance sheets must be reduced in response to increased equity requirements, or that deposits must be reduced, this is false. By issuing new

¹⁵This and other quotations cited in the paper are intended to be representative of common arguments that have entered the policy debate on capital regulation. They may not reflect the complete or current views of those cited.

equity if necessary, banks can respond to increased capital requirements without affecting any of their profitable or socially valuable activities.

Statements such as the ones above predict that potentially dire consequences would result from increasing capital requirements, and these have received the attention of regulators and policy makers. While one should be concerned about the effects proposed regulations might have on the ability of banks to carry out their core business activities, increasing the size of the equity cushion does not in any way mechanically limit the ability of a bank to lend.

To see this, consider a very simple example. Assume that capital requirements are initially set at 10%: a bank's equity must be at least 10% of the value of the bank's assets.¹⁶ For concreteness, suppose that the bank has \$100 in loans, financed by \$90 of deposits and other liabilities, and \$10 of equity, as shown in the initial balance sheet in Figure 1.

Now assume that capital requirements are raised to 20%. In Figure 1 we consider three ways in which the bank balance sheet can be changed to satisfy the higher capital requirement, fixing the value of the bank's current assets.¹⁷ One possibility is shown in Balance Sheet A, where the bank "delevers" by significantly scaling back the size of its balance sheet, liquidating \$50 in assets and using the proceeds to reduce total liabilities from \$90 to \$40. In Balance Sheet B, the bank satisfies the higher 20% capital requirement by recapitalizing, issuing \$10 of additional equity and retiring \$10 of liabilities, and leaving its assets unchanged. Finally, in Balance Sheet C, the bank expands its balance sheet by raising an additional \$12.5 in equity capital and using the proceeds to acquire new assets.

Figure 1: Alternative Responses to Increased Equity Requirements

Initial Balance Sheet	Revised Balance Sheet with Increased Capital Requirements													
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Loans: 100</td> <td style="width: 50%; text-align: center;">Equity: 10</td> </tr> <tr> <td></td> <td style="text-align: center;">Deposits & Other Liabilities: 90</td> </tr> </table>	Loans: 100	Equity: 10		Deposits & Other Liabilities: 90	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Loans: 50</td> <td style="width: 50%; text-align: center;">Equity: 10</td> </tr> <tr> <td></td> <td style="text-align: center;">Deposits & Other Liabilities: 40</td> </tr> </table> <p>A: Asset Liquidation</p>	Loans: 50	Equity: 10		Deposits & Other Liabilities: 40	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Loans: 100</td> <td style="width: 50%; text-align: center;">Equity: 20</td> </tr> <tr> <td></td> <td style="text-align: center;">Deposits & Other Liabilities: 80</td> </tr> </table> <p>B: Recapitalization</p>	Loans: 100	Equity: 20		Deposits & Other Liabilities: 80
Loans: 100	Equity: 10													
	Deposits & Other Liabilities: 90													
Loans: 50	Equity: 10													
	Deposits & Other Liabilities: 40													
Loans: 100	Equity: 20													
	Deposits & Other Liabilities: 80													
		<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Loans: 100</td> <td style="width: 50%; text-align: center;">Equity: 22.5</td> </tr> <tr> <td></td> <td style="text-align: center;">Deposits & Other Liabilities: 90</td> </tr> <tr> <td style="text-align: center;">New Assets: 12.5</td> <td></td> </tr> </table> <p>C: Asset Expansion</p>	Loans: 100	Equity: 22.5		Deposits & Other Liabilities: 90	New Assets: 12.5							
Loans: 100	Equity: 22.5													
	Deposits & Other Liabilities: 90													
New Assets: 12.5														

¹⁶ To keep the examples straightforward, we consider simplified versions of capital requirements. Actual current capital requirements are based on risk adjustments and involve various measures of the bank's capital (e.g., Tier 1 and Tier 2). The general points we make throughout this article apply to more complex requirements.

¹⁷ In this example, we are focusing on the mechanics of how balance sheets can be changed to meet capital requirements. We are intentionally ignoring for now tax shields and implicit government guarantees associated with a bank's debt financing, as well as how changes in a bank's capital structure alter the risk and required return of the bank's debt and equity. We discuss these important issues in detail in subsequent sections.

Note that only when the bank actually shrinks its balance sheet, as shown in A, is the bank reducing the amount of lending it can undertake. In both B and C the bank can support the same amount of lending as was supported by the original balance sheet.

In balance sheet B some liabilities are replaced with equity. Specific types of liabilities, such as deposits, are part of a bank's "production function" in the sense that their issuance is related to the provision of transactions and other convenience services that the bank provides to its customers. At a first glance, therefore, balance sheet B might seem to imply that higher capital requirements force the bank to reduce its supply of deposits, which would be socially costly if the associated services are both profitable for the bank and beneficial for the economy.¹⁸ In practice, however, deposits are not the sole form of bank liabilities. For example, non-trivial portions of bank finance, especially for large commercial banks, come in the form of long-term debt. Replacing a portion of this long-term debt with equity will increase bank capital without reducing its productive lending and deposit-taking activity.¹⁹ Given the fact that banks are not wholly funded by deposits, banks can meet increased capital requirements without reducing the amount of their deposits or the amount of their assets.

It is also possible for a bank to comply with higher capital requirements in a way that does not reduce the dollar value of either the liabilities or the assets. Balance Sheet C meets the higher capital requirements while keeping both the original assets (e.g. loans) and all of the original liabilities (including deposits) of the bank in place. Additional equity is raised and new assets are acquired. In the short run, these new assets may simply be cash or other marketable securities (e.g. Treasuries) held by the bank. As new, attractive lending opportunities arise, these securities provide a pool of liquidity for the bank to draw upon to expand its lending activity.²⁰

It is important to emphasize that, *as long as the bank is currently solvent*, Balance Sheet C is always viable; the bank should be able to raise the desired capital quickly and efficiently through, for example, a rights offering. Indeed, the inability to raise the capital needed to move to Balance Sheet C provides definitive evidence of the bank's insolvency.^{21 22}

¹⁸ For example, Gorton (2010), Gorton and Metrick (2009), Stein (2010) and others argue that short-term liabilities and deposits command a "money-like" convenience premium based on their relative safety and the transactions services that safe claims provide. Gorton and Pennacchi (1990) and Dang, Gorton and Holmström (2012) stress the importance of the "information insensitivity" of these claims in providing these services. Van den Heuvel (2008) considers the loss of convenience services from deposits to be the major welfare cost of bank capital regulation.

¹⁹ According to the FDIC website, as of March 31st, 2010, domestic deposits at U.S. commercial banks totaled \$6,788 billion, which represented 56.2% of total assets, while equity represented 10.9% of assets. This leaves 32.9% of the assets, which is almost \$4 trillion in non-deposit liabilities. Quite possibly, some of these liabilities can be converted to equity without affecting the provision of important bank services.

²⁰ One might worry that it would be costly or inefficient for the bank to hold additional securities or one might be concerned about the impact of such a change on the overall demand and supply of funding. We discuss these issues in detail in Section 7 and comment on implementation issues in the concluding remarks (Section 9).

²¹ To see why, note that as long as the market value of the bank's assets A exceeds existing claims D , after raising capital C the bank's equity is worth $A + C - D > C$. Thus the bank can offer shares worth C to attract the new capital. One might be concerned that the fear of future dilution might reduce the amount investors are willing to pay for the new shares issued. However, future dilution would only destroy the value of the option to default, which in this setting would be incremental to the difference between the value of the assets ($A+C$) and the face value of the debt (D). Having future dilution destroy this incremental amount does not affect the basic inequality $A + C - D > C$.

To summarize, in terms of simple balance sheet mechanics, the notion that increased equity capital requirements *force* banks to reduce deposits and/or lending activities is simply false. Banks can preserve or even expand lending activities by changing to Balance Sheets B or C. So, if higher capital requirements actually lead banks to reduce lending activities, it must be that some costs or certain frictions lead the bank to pass up on otherwise profitable loans.

We have phrased this discussion in terms of a single bank and its balance sheet. Our argument is just as pertinent, however, when analyzing the banking sector as a whole or even the overall economy. Consider van den Heuvel (2008), which derives a formula that has been used by policy analysts to evaluate the impact of increased capital requirements. His model assumes that banks are financed only with equity and deposits, and it is based on assumptions that guarantee that no risky firms exist in equilibrium and that the only equity claims held in equilibrium are those issued by the bank. Effectively these restrictive assumptions preclude an adjustment to higher capital requirements of the sort depicted in Balance Sheet C. Increased capital requirements thus require that bank's substitute equity for deposits, resulting in a welfare loss under the model's assumption that consumers derive utility from holding deposits. Given that in reality banks can satisfy higher capital requirements without reducing their deposit base, applying this model to assess the welfare costs of capital requirements seems highly suspect if not meaningless.²³

In the sections that follow, we examine various claims that have been made suggesting that increased equity capital requirements entail high costs or create distortions in lending decisions.

²² The term insolvency here should be interpreted in a wide sense, with an assessment of future prospects including the bank's future profit opportunities. If there is excess capacity in banking and banks are unprofitable, some downsizing of the industry is called for, and will actually happen if market mechanisms are allowed to work, but as long as the downsizing has not yet occurred, investors may be uncertain as to which banks are solvent and which banks are not and therefore be unwilling to pay appropriate prices for new shares.

²³ Given these limitations, we find it remarkable that some in the regulatory community are using the van den Heuvel (2008) formula in assessing the welfare costs of capital regulation under Basel III; see for example NY Fed Staff Report by Angelini et al (2011). Van den Heuvel (2008) himself comes to the conclusion "that capital requirements are currently too high" (p. 316). One upper bound for the cost that he gives stands at \$1.8 billion per year for an increase in equity capital requirements by one percentage point (p.311). Given the role of insufficient equity in the crisis that followed shortly after van den Heuvel made his claim that banks should be even more highly leveraged, his assessment seems as problematic as his method.

3.3 Equity Requirements and Return on Equity (ROE)

“... bank capital is costly because the higher it is, the lower will be the return on equity for a given return on assets. In determining the amount of bank capital, managers must decide how much of the increased safety that comes with higher capital (the benefit) they are willing to trade off against the lower return on equity that comes with higher capital (the cost).” Mishkin (2013, p. 227)

“Demands for Tier-1 capital ratio of 20%... could depress ROE to levels that make investment into the banking sector unattractive relative to other business sectors.” Ackermann (2010, p. 5.)

Statement: “Increased equity requirements will hurt bank shareholders since it would lower the banks return on equity (ROE).”

Assessment: This is false; a reduction in ROE does not indicate decreased value added. While increased capital requirements can lower the Return on Equity (ROE) in good times, they will raise ROE in bad times, reducing shareholder risk.

One concern about increasing equity capital requirements is that such an increase will lower the returns to the bank’s investors. In particular, the argument is often made that higher equity capital requirements will reduce the banks’ Return on Equity (ROE) to the detriment of their shareholders.²⁴

This argument presumes that ROE is a good measure of a bank’s performance. Since ROE (or any simple measure of the bank’s return) does not adjust for scale or risk, there are many potential pitfalls associated with this presumption. Using ROE to assess performance is especially problematic when comparisons are made across different capital structures. The focus on ROE has therefore led to much confusion about the effects of capital requirements on shareholder value.

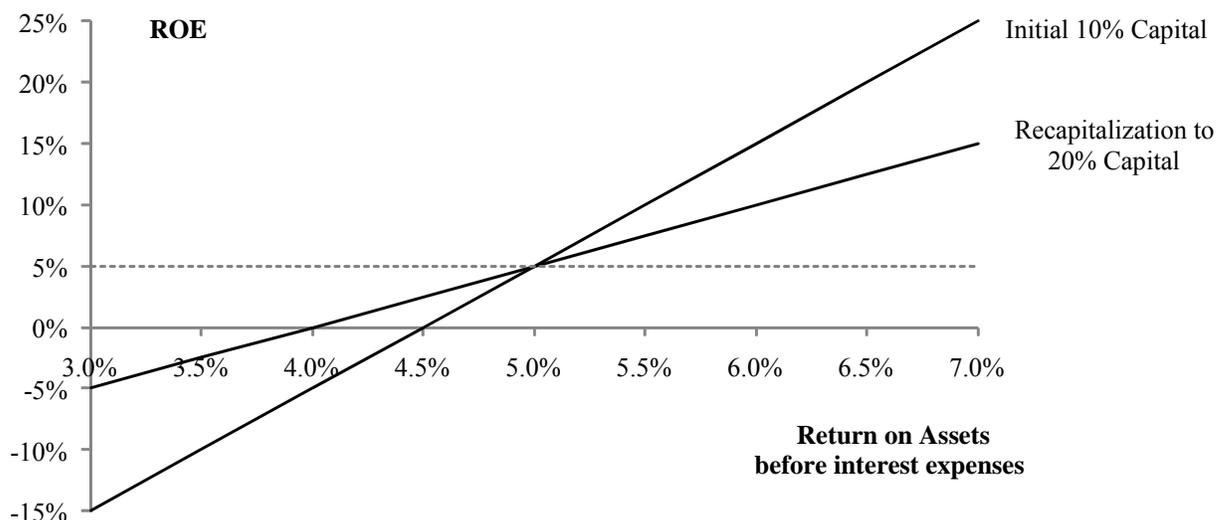
We illustrate the consequence of an increase in equity capital on ROE in Figure 2. This figure shows how the bank’s realized ROE depends on its return on assets (before interest expenses). For a given capital structure, this dependence is represented by a straight line.²⁵ This straight line is steeper the lower the share of equity in the bank’s balance sheet. Thus, in Figure 2, the steeper line corresponds to an equity share of 10%, the flatter line to an equity share of 20%. The two lines cross when the bank’s ROE is equal to the (after-tax) rate of interest on debt

²⁴ Accounting ROE is defined as net income / book value of equity. A related financial measure is the *earnings yield*, which is net income / market value of equity, or equivalently, the inverse of the bank’s P/E multiple. The discussion in this section applies equally well to the earnings yield, replacing book values with market values throughout.

²⁵ More precisely, $ROE = (ROA \times A - r \times D) / E = ROA + (D/E)(ROA - r)$, where ROA is the return on assets before interest expenses (i.e. $EBIT \times (1 - \text{Tax Rate}) / (\text{Total Assets})$), A is the total value of the firm’s assets, E is equity, D is debt, and r is the (after-tax) interest rate on the debt.

(which in that case is also equal to the ROA before interest), assumed to be 5% in the figure.²⁶ Above that level, ROE is indeed lower with higher capital. Below the 5% level, however, ROE is higher with higher capital, as the cushioning effect of higher capital provides downside protection for equity holders and reduces their risk.

Figure 2: The Effect of Increased Equity on ROE



The figure illustrates the following key points:

- For a given capital structure, ROE does reflect the realized profitability of the bank’s assets. But when comparing banks with different capital structures, ROE *cannot* be used to compare their underlying profitability.²⁷
- Higher equity capital requirements will tend to lower the bank’s ROE only in good times when the return on assets is high. They will raise the ROE in bad times when the return on assets is low. From an *ex ante* perspective, the high ROE in good times that is induced by high leverage comes at the cost of having a very low ROE in bad times.

On average, of course, banks hope to (and typically do) earn an ROE in excess of the return on their debt. In that case, the “average” effect on ROE from higher equity capital requirements would be negative. For example, if the bank expects to earn a 15% ROE on average with 10% capital, it will only earn a 10% ROE on average with 20% capital. Is this effect a concern for shareholders?

²⁶ If the bank had met the higher capital requirements by expanding its assets rather than recapitalizing (Case C in Figure 1), the “break-even” ROE would be the after-tax return of the new assets acquired by the bank.

²⁷ For example, a manager who generates a 7% ROA (before interest expense) with 20% capital will have an ROE of 15%. Alternatively, a less productive manager who generates a 6.5% ROA (before interest expense) yet has 10% capital will have an ROE of 20%. Thus, when capital structures differ, a higher ROE does not necessarily mean a firm has deployed its assets more productively.

The answer is no. Because the increase in capital provides downside protection that reduces shareholders' risk, *shareholders will require a lower expected return to be willing to invest in a better capitalized bank*. This reduction in the required return for equity will be in line with the reduction in the average ROE, leading to no net change in the value to shareholders (and thus the firm's share price). Indeed, in the above example, if the equity investors required a 15% expected return initially when the bank has only 10% equity, we would expect their required return to fall to 10% when the bank has 20% equity due to the reduction in risk with the increase in the bank's capital.²⁸ Because shareholders continue to earn their required return, there is no cost associated with the increase in equity capital.²⁹

3.4 Capital Structure and the Cost of Capital

“The problem with [equity] capital is that it is expensive. If capital were cheap, banks would be extremely safe because they would hold high levels of capital, providing full protection against even extreme events. Unfortunately, the suppliers of capital ask for high returns because their role, by definition, is to bear the bulk of the risk from a bank's loan book, investments and operations” Elliott (2009, p. 12).

Statement: “Increased equity requirements increase the funding costs for banks because they must use more equity, which has a higher required return.”

Assessment: This argument is false. Although equity has a higher required return, this does *not* imply that increased equity capital requirements would raise the banks' overall funding costs.

The example of the previous section exposes a more general fallacy regarding equity capital requirements. Because the required expected rate of return on equity is higher than that on debt, some argue that if the bank were required to use more of this “expensive” form of funding, its overall cost of capital would increase.

This reasoning reflects a fundamental misunderstanding of the way in which risks affect the cost of funding. While it is true that the required return on equity is higher than the required return on debt and it is also true that this difference reflects the greater riskiness of equity relative to debt, it is *not* true that by “economizing” on equity one can reduce capital costs.

²⁸ To see why, note from Figure 2 that doubling the bank's capital cuts the risk of the bank's equity returns in half (the same change in ROA leads to ½ the change in ROE). Thus, if shareholders initially required a 15% average return, which corresponds to a 10% risk premium to hold equity versus safe debt, then with twice the capital, because their sensitivity to the assets' risk (and thus their “beta”) has been halved, they should demand ½ the risk premium, or 5%, and hence a 10% required average return.

²⁹ As we have seen, because of ROE's failure to account for both risk and capital structure, it is not a useful measure of a manager's contribution to shareholder value. Most management experts prefer alternatives such as the firm's economic value added (EVA) or residual income. Residual income is defined as $(ROE - r_E) \times E$, where r_E is the firm's risk-adjusted equity cost of capital, and E is the firm's equity. Residual income thus adjusts both for the risk and scale of the shareholders' investment. Simple changes in capital structure will not alter the firm's residual income.

“Economizing” on equity itself has an effect on the riskiness of equity and, therefore, on the required expected return of equity. This effect must be taken into account when assessing the implications of increased equity capital requirements for banks’ cost of capital.

Figure 2 indicates that fluctuations in the bank’s ROE that are induced by changes in the profitability of its assets are greater the less equity the bank issues. When the bank is funded with relatively more equity, a given asset risk translates into less risk for its shareholders. Reflecting this reduction in risk, the risk premium in the expected ROE will be lower. Since the additional equity capital will generally reduce the bank’s bankruptcy risk, the interest rate on its debt will also be lower.³⁰ These reductions of risk premia in required rates of return counteract the direct effects of shifting from debt finance to equity finance, from an instrument with a low required rate of return to an instrument with a higher required rate of return. The net effect need not increase the total funding costs of the bank at all.³¹

One of the fundamental results of corporate finance (Modigliani and Miller, 1958) states that, absent additional considerations such as those involving tax advantages or public subsidies to debt, increases in amount of financing done through equity simply changes how risk is allocated among various investors in the bank, i.e., the holders of debt and equity and any other securities that the bank may issue. The total risk itself does not change and is given by the risks that are inherent in the bank’s asset returns. In a market in which risk is priced correctly, an increase in the amount of equity financing lowers the required return on equity in a way that, absent subsidies to bank debt and other frictions, would leave the total funding costs of the bank the same.

The Modigliani-Miller analysis is often dismissed on the grounds that the underlying assumptions are highly restrictive and, moreover, that it does not apply to banks, which get much of their funding in the form of deposits. The essence of this result, however, is that in the absence of frictions and distortions, changes in the way in which any firm funds itself does not change either the investment opportunities or the overall funding costs determined in the market by final investors. The one essential assumption is that investors are able to price securities in accordance with their contribution to portfolio risk, understanding that equity is less risky when a firm has less leverage i.e., funds itself with less debt.³² The validity of this assumption is fundamental to modern asset and derivative pricing.³³ Indeed, it is the analogue to the observation in debt

³⁰ There are two special cases where additional capital will not lower interest rates on debt. One is the case where the bank is initially so well capitalized and the risk of the bank’s assets is so low that the bank’s debt is essentially riskless even before additional capital is added. The second case occurs when the government implicitly guarantees the bank’s debt. The additional capital reduces the burden on the government but will not change the pricing of the bank’s debt.

³¹ Continuing our earlier example (see fn. 11), given 10% equity capital the required return was 15% for equity and 5% for debt, for an average cost of $10\% \times 15\% + 90\% \times 5\% = 6\%$. With 20% equity capital the required return for equity falls to 10% (with a 5% cost of debt), leading to the same average cost of $20\% \times 10\% + 80\% \times 5\% = 6\%$.

³² In particular, the result does not presume full investor “rationality” in the sense that investors must maximize a utility function, etc. For the most general formulation of the Modigliani and Miller (1958) result, see Stiglitz (1969, 1974), Hellwig (1981), and DeMarzo (1988). For comments on the relevance of Modigliani and Miller’s insight to banking, see Miller (1995) and Pfleiderer (2010).

³³ Despite its fundamental importance, empirically establishing this relationship is notoriously difficult. First, given the magnitude of volatility, estimating annual returns even to within a few percentage points requires hundreds of years of data. Second, the relationship between realized returns and expected returns is unclear, and may be distorted for long periods when market participants are learning about trends. For example, Baker and Wurgler (2013)

markets that the yield on junior debt will increase with an increase in the amount of senior debt; or equivalently, yields vary inversely with seniority.

As for the argument that the Modigliani-Miller analysis does not apply to banks, it is certainly true that deposits and perhaps some other liabilities issued by banks follow a different logic because investors hold these bank liabilities for various services that come bundled with them in addition to returns they provide. For example, bank investors (a.k.a., customers) put money into demand deposits because they value the convenience of having ready access to cash through ATMs, or because they value the transactions services they get from checking, bank transfers, credit and debit cards associated with these deposits. On the banks' side, provision of these services is a productive activity, generating producers' surplus from the difference between revenues received over the costs, which include the real costs of providing services. However, many banks, in particular large banks, have significant market-rate funding through debt markets. At the margin, therefore, for changes in the debt-equity mix that leave deposits and similar liabilities unchanged, the Modigliani-Miller arguments are fully applicable.³⁴ As we discuss in Sections 5.1 and 7, the ability to provide liquidity and other transaction services can actually be enhanced if banks issue more equity and are not so highly leveraged.

Confusions based on not understanding the basic Modigliani-Miller arguments show up not only in discussions about the overall funding of a bank, but also in discussions about the funding of particular investments that banks make. As an example, consider the following description by Acharya, Schnabl, and Suarez (2013, p. 533) of how banks appear to assess the profitability of using conduits and structured investment vehicles in order to invest in mortgage-backed securities without backing them by equity capital.

“We can assess the benefits to banks by quantifying how much profit conduits yielded to banks from an ex ante perspective using a simple back-of-the-envelope calculation. Assuming a risk weight of 100% for under-lying assets, banks could avoid capital requirements of roughly 8% by setting up conduits relative to on-balance sheet financing. We assume that banks could finance short-term debt at close to the riskless rate, which is consistent with the rates paid on ABCP before the start of the financial crisis. Further assuming an equity beta of one and a market risk premium of 5%, banks could reduce the cost of capital by $8\% * 5\% = 0.004$ or 40 basis points by setting up conduits relative to on-balance sheet financing.

demonstrate that well-known empirical anomalies associated with CAPM also apply to banks, indicating that we have yet to develop an adequate model for empirically assessing risk and return. Tsatsaronis and Yang (2012), using different risk adjustments, find that required returns are higher for banks with higher leverage.

³⁴ DeAngelo and Stulz (2013) suggest that, because of “liquidity benefits” associated with deposits, it might be optimal to have all bank funding come in the form of deposits, so that there is no room for changing the debt-equity mix even at the margin. Hellwig (2013) shows that the analysis of DeAngelo and Stulz rests on two critical assumptions: (i) The assumption that marginal liquidity benefits of having bank funding come through deposits rather than shares or bonds are always greater than the marginal costs, so that the efficient deposit level is unbounded; (ii) the assumption that deposits are fully backed by riskless assets. If (i) is violated, some bank funding will come through shares or bonds whenever savings exceed the maximal efficient deposit level. If (ii) is violated, it is efficient to have banks fund with equity as a way of enlarging the range of outcomes in which they are solvent so that deposits are actually liquid and not frozen in bankruptcy. See also Admati and Hellwig (2013a, Chapter 10), and Admati and Hellwig (2013c, Claims 5-6).

Comparing the costs and benefits of conduits, it seems clear that conduits would not have been profitable if banks had been required to hold equity against the assets in their conduits to the same extent as for assets on their balance sheets. In fact, banks would have made a loss (negative carry) of 30 basis points on each dollar invested. However, given that banks were not required to hold equity to the same extent as for assets on their balance sheets, they could earn a profit of 10 basis points.”

In this analysis, the profitability of investing in mortgage-backed securities is assessed by comparing expected returns on additional investments with required returns on particular financing instruments.³⁵ It is asserted that if no equity is used for refinancing, the investment earns 10 basis points over the calculated financing rates, while if 8% of the investment must be refinanced by equity, the investment falls 30 basis points short of the calculated financing rates. Completely missing from this type of calculation is any consideration of risk and who is bearing it. In particular, completely ignored in this discussion are the effects that different ways of financing the mortgage-backed securities have on other stakeholders in the bank (i.e., shareholders, other creditors, and third parties providing guarantees).

To make the fallacy involved in ignoring risk in the profit calculation given in Acharya, Schnabl, and Suarez (2010) completely obvious, consider the implications of the argument taken to the extreme. If one simply compares investment return with apparent financing costs to compute profitability as is done in the example above, then it follows that almost *any* bank and *any* firm can significantly increase its “profitability” by issuing debt and using the proceeds to buy the debt issued by firms with lower credit ratings. A firm with a rating of A might be able to issue debt at 6% and use the proceeds to finance investment in B-rated debt with an expected return of 7.5%, producing 150 basis points of “pure profit.” Of course, it is easily seen that this increases risk and the shareholders must be compensated for this. The true question is whether the extra 150 basis points in return compensates for this increased risk. In a similar manner the true question in the case of the conduit is whether a premium of 10 basis points over refinancing rates compensate shareholders and others for the additional risk imposed by financing it through a conduit using asset backed commercial paper.

Finally, the assumptions underlying the Modigliani-Miller analysis are the very same assumptions that underlie the quantitative models that banks use to manage their risks, in particular, the risks in their trading books. Anyone who questions the empirical validity and relevance of an analysis that is based on these assumptions is implicitly questioning the reliability of these quantitative models and their adequacy for the uses to which they are put – including that of determining required capital under the model-based approach for market risks. If we cannot count on markets to correctly price risk and adjust for even the most basic consequences of changes in leverage, then the discussion of capital regulation should be far more encompassing than the current debate.

³⁵ Boot (1996) and Boot and Schmeits (1998) argue that in making investment decisions bankers use a type of “mental accounting” where they match the loans they make with particular sources of funding, and compare returns on that basis.

4. Arguments Based on a Confusion of Private and Social Costs

As we have shown in the previous section, a number of prominent arguments for why equity capital is costly are simply fallacious. In this section we consider several reasons why bank shareholders will resist attempts to increase capital. These include the loss of tax and bailout subsidies associated with debt. They also include the redistribution that is involved in making debt safer at the shareholders' expense. However, while these arguments explain shareholder resistance to increased capital, all of these "costs" represent transfers to creditors or taxpayers. Thus, they are private rather than social costs. Socially optimal capital requirements depend on social costs, rather than the private costs to one participant. In assessing social costs, one must consider the immediate benefits to taxpayers and creditors that are the counterpart of the private costs to shareholders. One must also consider the costs to third parties that are due to banks' being highly leveraged and therefore very risky. As was seen in 2007-2009, distress or default of banks, especially of "systemic" banks can have severe negative consequences for the rest of the economy.

4.1 Tax Subsidies of Debt

"In the real world of tax biases in favor of debt... there clearly is a private cost penalty to higher equity requirements, and the case that tighter [capital] requirements increase the cost of long-term credit provision appears fairly clear."
Turner (2010, p. 25)

Statement: "Increased equity requirements increase the funding costs for banks because they reduce the ability of banks to benefit from the tax shield associated with interest payments on debt."

Assessment: When debt has a tax advantage over equity, this statement is true. However, in the absence of distortions taxes only create private costs, not social costs. Moreover, it is irrelevant to the debate about capital regulation in the sense that *both capital regulation and taxes are matters of public policy*, and whatever policy objectives stand behind the current tax treatment of bank debt can also be attained by other instruments that would not create a bias in favor of bank debt.

Since, as discussed above, tax shields effectively subsidize debt financing, requiring banks to use less debt financing can raise banks' cost of capital.³⁶ From a public-policy perspective, however, this effect is irrelevant as it concerns only the distribution of public money. The tax savings that a bank obtains by relying on debt rather than equity finance reduce the government's tax revenue and require either a reduction in spending on public goods or an increase in taxes elsewhere. While the bank gains from the debt tax shield, the public loses, and ultimately, the

³⁶ Note, however, this effect is mitigated if dividends or capital gains on shares are taxed at a lower rate than interest income at the level of personal income taxation. Whether debt actually has a tax advantage depends on whether the sum of corporate and investor-level taxes on equity income exceeds or falls short of interest income taxes at the personal level.

argument concerns the optimal amount of government spending and the optimal structure of taxation. Taxes should be structured to minimize the overall distortions they induce. In particular, taxes (and subsidies) should be set so as to encourage behavior that generates positive externalities and to discourage behavior that generates negative externalities.

By these criteria, refraining from requiring banks to have more equity on the grounds that this would raise their taxes makes no sense. If the prospect of saving on corporate income taxes induces banks to be highly leveraged, this generates a negative externality because the increase in leverage raises the probability of a bank failure, weakening the financial system and imposing losses on the broader economy. Given these externalities associated with high leverage of financial institutions, tax policy should not encourage leverage. If anything, tax policy should be designed to make banks internalize the social costs imposed by high leverage. This would be done by having equity the tax-favored form of financing, not debt.

Even abstracting from the external effects of default, a tax subsidy to debt finance induces a distortion in the allocation of funds between corporations that can borrow extensively and corporations that use more equity finance.³⁷ Banks that can be highly leveraged because of implicit government guarantees enjoy an additional and unwarranted advantage over other firms, because high leverage allows them to capture a greater tax subsidy. While some of this advantage may be passed on to the firms to which banks provide loans, there is no reason to believe that this suffices to neutralize the distortion. Whether one concludes that the tax code should be changed with respect to corporate taxation more broadly or should only be corrected at the level of the banking industry, one must conclude that the current situation is clearly undesirable.³⁸

If the tax code is not changed to reduce or eliminate the distortion in favor of debt finance, it still is important to recognize that the tax-induced increase in funding costs that banks experience with higher equity is a *private* cost to banks, not a *social* cost. From the policy perspective, the private cost to banks is balanced by increased tax revenues and, probably more importantly, by reduced risks of bank failures and systemic fallout from such failures. Giving a tax advantage to bank debt is like subsidizing pollution. Imposing an equity requirement is like requiring the chemical company to use another technology that has the same costs – *except* for the subsidy.

Some authors suggest that, if the banks' funding costs go up because, with more equity, their tax bills would be higher, the increase in funding costs will induce banks to charge higher loan rates. Therefore, they claim, we should refrain from raising equity requirements "too much."³⁹

³⁷ Han, Park and Pennacchi (2013) find that U.S. commercial banks sell through securitization more of their mortgages when they operate in states that impose higher corporate income taxes. Since securitization may reduce incentives for creditworthiness assessment, this finding suggests a possible indirect distortive effect of the tax code.

³⁸ Some considerations of optimal tax theory actually suggest that corporate income should not be taxed (at least in expectation). In that sense the current tax code can be thought of as penalizing equity rather than subsidizing debt. (See Mankiw, Weinzierl and Yagan (2009), as well as Boskin (2010)). Poole (2009) estimates that reducing the corporate tax rate to 15% and not allowing financial institutions to deduct interest would result in the same total corporate tax expense as was actually incurred by these institutions. More generally, even without fundamentally changing the tax code, it is quite straightforward to neutralize the impact of increased equity capital requirements on the tax liabilities of banks. Any tax subsidies lost due to a reduction in leverage can be easily replaced with alternative deductions or tax credits.

³⁹ Elliot (2013, p. 3) claims that "absent these changes [in the tax code]... credit would become pricier and potentially less available. This represents an economic cost."

The argument presumes that low loan rates are always desirable. In fact, low loan rates are undesirable if they do not properly reflect the social costs of the loans that are being made. Excessive and cheap lending can be a major cause of waste of resources.⁴⁰

If indeed it is viewed as socially desirable to subsidize bank lending to individuals or small businesses who do not have a wide array of financing options, a tax credit associated with bank *lending* to such borrowers would be more targeted and would avoid the negative externalities associated with subsidizing bank *borrowing*.⁴¹

4.2 Bailouts and Implicit Government Guarantees

Statement: “Increased equity requirements increase the funding costs for banks because they prevent banks from being able to borrow at the low rates implied by the presence of government guarantees.”

Assessment: This statement is again correct, but it concerns only private, not social costs. Government guarantees that allow banks to enjoy cheap debt financing create numerous distortions and encourage excessive leverage and excessive risk taking. Because of the distorted incentives as well as the difficulty for governments to commit never to bail out banks, it is challenging to neutralize this effect by charging banks for the true cost of the guarantees on an ongoing basis. In this context, equity cushions are particularly valuable, as they reduce the likelihood and cost of the guarantees.

Explicit or implicit government guarantees immunize the banks’ creditors against the consequences of a default by the bank. As a result, the default risk premium in the interest rates demanded by the bank’s creditors is lower and may even be zero. Institutions that benefit from such guarantees, e.g., institutions that are deemed to be “too big to fail,” are therefore able to borrow at lower interest rates. The savings in capital costs that are thereby achieved are larger the more leverage the bank has.

From a public policy perspective, the effect of increased equity requirements reducing banks’ ability to capture these subsidies is not relevant because, similar to the case of the tax advantage of debt, it concerns private, rather than social costs of bank capital. The lower borrowing rates benefiting banks and their shareholders have a counterpart in the default risks borne by the taxpayer. Any consideration of social costs must encompass the costs of these risks to taxpayers. Once this is taken into account, one sees that the effects of government guarantees on borrowing rates provide no reason to refrain from requiring banks to have more capital. By the same argument as before, if lower borrowing rates based on government guarantees induce banks to be

⁴⁰ Boom-and-bust cycles in lending are a constant feature of modern history. The houses that were financed with subprime mortgages and are now standing empty and decaying provide just one illustration of how wasteful such excessive lending can be.

⁴¹ Of course, cheap lending need not always be desirable – it can also lead to a substantial waste of resources. Boom-and-bust cycles in lending are a constant feature of modern history. Houses that were financed with subprime mortgages and are now standing empty and decaying provide just one illustration of how wasteful such excessive lending can be.

highly leveraged, this imposes a negative externality on the rest of the economy because the increase in leverage raises the probability of distress and the resulting systemic risk.

The negative externalities here are likely to be even larger than those associated with the tax benefits of debt finance. The tax benefits of debt finance are largest when the bank does well and makes profits. The subsidy from government guarantees is worth most when the bank does poorly and is unable to service its debt. From an *ex ante* perspective, this makes it attractive for the bank to engage in strategies that involve a positive default risk. Of course, some default risk may be unavoidable, but to the extent that there is a choice, the availability of explicit or implicit government guarantees of bank debt creates a bias towards choosing risky strategies to exploit the guarantees, providing shareholders with nice returns if they succeed and saddling the government with the losses if they fail.

As is well known, such a bias towards choosing an excessively risky strategy is present even without government guarantees. The mere existence of debt, with a payment obligation that is independent of the bank's asset returns, creates incentives for a bank's shareholders, or for its managers acting on the shareholders' behalf, to take risks according to the principle "heads, I win, tails, the creditor loses." Under these strategies, increases in default probabilities or losses in default, which hurt the creditors, are traded for increases in returns in the event where everything goes well, which benefit shareholders. From the perspective of the debtholders, this is a *moral hazard* problem, i.e., it is a hazard that is not due to natural perils outside of the participants' sphere of influence, but due instead to the behavior of the banks and the banks' managers who control the use of the funds.

In the absence of any government guarantees, a bank's creditors would try to limit such moral hazard. If it were possible to write contracts so that the bank fully commits *ex ante* to its strategy choices, the parties would mutually agree to put such covenants into their contracts. If such commitments are ineffective, the creditors will ask for higher rates or even refuse to provide the bank with funds altogether. In all of those cases in which effective covenants cannot be written, the moral hazard will prevent the partners from choosing a fully efficient arrangement, but, given the constraints imposed by the bank's inability to fully commit its strategy *ex ante*, the arrangement they come up with may be presumed to be "second best."

Explicit or implicit government guarantees can greatly reduce the need for the insured creditors to worry about their bank's strategy choices and default prospects. If the government can be expected to step in when the bank defaults, the creditors generally have no reason to refrain from lending to the bank or to demand a significant default risk premium. The resulting arrangement may be far less desirable than even second best.

Politicians are fond of saying that we must make sure bailouts *never* happen. In fact, it is extremely difficult, if not impossible, to *commit* never to bail out a financial institution. Indeed, it may not even be desirable to make such a commitment, since a bailout might be the preferred course of action during a crisis. For this reason the focus must be on structuring financial regulations to minimize or ideally eliminate the possibility that institutions will need to be bailed out. Some recent proposals for financial regulation involve the creation of a "resolution authority" that will have funds ready to help banks and other financial institutions in situations of financial distress. If the government charged a fee (a form of "bank tax") for the protection it is giving through this mechanism, and if this fee always reflected the true cost of the guarantees, then the subsidy associated with implicit guarantees would be removed. However, accurately

adjusting the fee to account for the risks that are actually taken would be challenging. More importantly, if it is difficult to monitor risks, then individual banks would have incentives to take on additional risks. This approach is not as effective as requiring significant increases in equity requirements. Equity, as a form of self-insurance, will be priced directly by financial markets based on its risk.⁴²

Systems providing “safety nets” to banks, including deposit insurance, the Fed’s discount window, and “lender of last resort,” can and do play a positive role as a stabilizing force, particularly in preventing bank runs that had routinely plagued banks. It is often difficult to price explicit guarantees, and implicit guarantees clearly provide a subsidy to the institution whose debt falls under the implicit guarantees. In this case, the result is that leverage is again subsidized.⁴³ Indeed, as discussed above, the system of capital regulation is motivated by the recognition that guarantees generate distortions and moral hazard problems. Higher equity requirements, by requiring that those who own residual claims in the bank bear much of the bank’s risk, reduce dependence on systems of guarantees and, instead, rely more on the private sector to provide safety to the financial system. Thus, they alleviate the distortions associated with the safety net.⁴⁴

4.3 Debt Overhang and Resistance to Leverage Reduction

Statement: “Issuing equity to decrease leverage is expensive because it will lower the value of shares of existing shareholders.”

Assessment: This statement is again correct but irrelevant to the policy debate. Any reduction in the value of existing shares is matched by equal benefit to either creditors or taxpayers who would be bearing less downside risk (and providing fewer other subsidies to debt).

Reducing the leverage of any firm may lower the value of existing shareholders’ claims. First, given the tax advantage of debt and the subsidies associated with implicit guarantees, the share price will decline to reflect the reduction in tax benefits and default subsidies. Second, if

⁴² Of course, cheap lending need not always be desirable – it can also lead to a substantial waste of resources. Boom-and-bust cycles in lending are a constant feature of modern history. Houses that were financed with subprime mortgages and are now standing empty and decaying provide just one illustration of how wasteful such excessive lending can be.

⁴³ On the size and distortions associated with bailouts and the safety net, see Akerlof and Romer (1993), Alessandri and Haldane (2009), Gandhi and Lustig (2010), Haldane (2010), Kane (2010), Carbo-Valverde et al. (2011), Davies Richard and Tracey (2012), and Kelly, Lustig, and Stijn Van Nieuwerburgh (2012). For a general discussion on moral hazard problems created by leverage and bailouts, see Geanakoplos (2010).

⁴⁴ Unfortunately, in recent years, the “safety net” of the banking sector seems to be expanding rather than contracting. According to Walter and Weinberg (2002), 45% of bank liabilities in the US were implicitly or, explicitly guaranteed in 1999. Malysheva and Walter (2010) estimate that this grew to 59% in 2008. Some have proposed recently that the safety net should be further expanded. For example, Gorton (2010, p.17), suggests expanding it to cover the so-called “shadow banking system” which, he argues “serves an important function, which should be recognized and protected.” In his words, “[c]reating a new Quiet Period requires that ‘bank’ debt be insured.” Gorton’s approach would result in further expansion of the safety net, which has the potential to further exacerbate the distortive incentives of guarantees.

the debt is currently risky, leverage reduction will usually reduce the risk to creditors and thus increase the value of the firm's (remaining) debt, which benefits creditors (or the deposit insurance and taxpayers who insure the debt) at shareholder's expense. The magnitude of the decline in the share price provides direct evidence regarding the decrease in default risk achieved by the leverage reduction. Clearly, however, *any cost to existing shareholders is not a social cost, but rather a transfer to existing creditors or taxpayers.*

When a firm is highly leveraged and faces substantial default risk, the risk to creditors is manifested through higher yields paid these creditors (or, equivalently, lower prices paid by creditors for debt with a given promised payment). If a borrower reduces leverage, this generally benefits existing creditors and increases the value of their claims. The gain to creditors comes at shareholder expense, and this effect, similar to that of "debt overhang" identified in Myers' (1977) explains the strong resistance of shareholders to leverage reductions. Myers (1977) coined the term "debt overhang" to explain shareholder resistance to raising equity to make new investments. Admati et al. (2013) show that this same effect is even more pronounced in the context of recapitalizations – shareholders will resist *any* degree of leverage reduction, no matter how inefficient the firm's current level of leverage.

Note that this effect is most severe when a firm is so highly leveraged that its debt is very risky and thus creditors (or taxpayers) stand to benefit significantly from the reduction in leverage. If the firm is less highly leveraged so that its debt is already close to being risk-free, the values of debt and existing equity are relatively insensitive to a leverage reduction, and the effect of debt overhang effect will be small. Thus, *shareholders have the greatest incentive to resist leverage reduction and increased equity requirements when leverage is already high.* Quite clearly, this is the situation in banking.

Most importantly, again, the cost borne by existing shareholders as a result of debt overhang is *not* a social cost. Rather, it represents a transfer from them to existing creditors or to taxpayers who are providing guarantees. Additional benefits to creditors and taxpayers come from the savings in losses and inefficiencies associated with bankruptcy and default. In the context of banks with deposit insurance and implicit government guarantees, the benefits of leverage reduction will flow to the deposit insurance corporations and to taxpayers as a reduction in the cost of the insurance and guarantees. In either case, because of the distortions created by high leverage and because of the dangers and costs from bank risks for the rest of the economy, social welfare will increase as a result of the leverage reduction.

In this context, it is also important to consider who exactly might be losing from leverage reduction when creditors and taxpayers benefit. Bank shareholders are depositors and taxpayers, and their portfolio of shares typically includes many other companies. Instability in banking and especially financial crises that require bailouts and harm the economy are costly to these shareholders. Those who benefit from high leverage are likely to be the banks' managers and possibly shareholders whose wealth is concentrated in bank shares. These individuals are not entitled to the subsidies and the upside of risks that are taken at the expense and harm of others. Thus, even if leverage reductions, at least in the transitions, are costly to these individuals, forcing banks to reduce leverage is in the public interest. In fact, as we discuss below, high leverage is not only harmful to the public, it is most likely highly inefficient even from the perspective of the value of the bank to its investors (net of the subsidies).

4.4 Leverage Ratchet: Why High Leverage May Even Be Privately Inefficient

Statement: “The fact that banks have chosen to become so highly leveraged suggests that such leverage is optimal.”

Assessment: This statement is false. First, banks have strong private incentives for leverage even when it is socially suboptimal. Second, once debt is in place, managers and shareholders have incentives to increase leverage to inefficient levels even if doing so reduces the total value of the bank to its investors.

We have already highlighted in Sections 4.1 and 4.2 the critical distinction, due to tax advantages and default subsidies, between the private considerations and the social tradeoffs relevant for society that are associated with banks’ leverage. Based on these subsidies, banks have an incentive to choose a privately optimal level of leverage that exceeds the social optimum.

Moreover, there are strong reasons to believe that bank leverage is excessive even relative to the private objective of maximizing the value of the bank to its investors. If at the very beginning, when a bank is founded, shareholders and creditors could commit to all future investment and funding decisions, their choice would be privately optimal. However, because such commitment is infeasible, the decisions that are actually taken at later dates reflect decision makers’ interests at the time. As we discussed in Section 4.3 and in Admati et al. (2013), once debt is in place, shareholders generally resist leverage reductions even if the reductions increase the total value of the firm. Thus, starting from an initial level of leverage, if leverage increases due to a decline in asset value, shareholders will not respond take actions to reduce leverage voluntarily. By contrast, shareholders may well choose to *increase* leverage in the event of a positive shock to asset values or other changes. Thus, absent the ability to commit to future leverage choices, we may observe a ratchet upward of leverage, especially in banking. Thus, the observed leverage levels are likely well above what would be chosen by banks ex ante to maximize their value to investors.

In Admati et al. (2013) we explore this leverage ratchet effect and its consequences for adjustments in leverage over time and in response to regulations. Brunnermeier and Oehmke (2013) show as well that in a “maturity rat race,” we are likely to see banks fund with debt whose maturity is increasingly shorter as a way to effectively make new creditors more senior to previous creditors; at very short maturities, the creditors are effectively better protected against being superseded by new creditors. While all these potential forces apply to non-financial firms as well as to banks, they are likely to be much more relevant for banks for three reasons. First, the debt overhang and leverage ratchet effects are likely to be weak until the firm becomes very highly leveraged. Second, for non-financial firms, creditors recognize these incentives and typically try to control for them through restrictive debt covenants. Bank depositors and other creditors, however, have not insisted upon the same level of oversight in part because they are shielded from the negative consequences of increased leverage and reduced maturity of debt by government guarantees. Finally, due to the nature of banks’ business, true leverage levels are often opaque and quite costly to monitor.

As a consequence, the only meaningful limit to the leverage ratchet for banks is due to bank capital regulation itself. In setting appropriate capital requirements that protect the public from collateral damage of the inefficient and dangerous leverage levels chosen by decision makers in banks based on their own incentives, policy makers will also be increasing the efficiency of the banks themselves by limiting losses due to the leverage ratchet.

5. Is High Leverage Efficient for Disciplining Bank Managers?

In the last section we saw how discrepancies between the private and social costs of funding by equity can arise from conflicts of interest between shareholders and debtholders about new funding choices. In this section, we provide a more general discussion of the implications of conflicts of interest for bank funding. Financial contracting is often seen as a device for dealing efficiently with information, incentive, and governance problems in the complex relations among a firm's managers, shareholders, creditors, and other investors. In this context, the distinctive features of debt may provide some advantages. Some participants in the debate therefore see government regulation of bank funding as potentially harmful because it prevents efficient private market solutions from being implemented.

A central concern in financial contracting is how those who provide funding for firms (including banks) can guarantee that they are compensated appropriately. This governance problem is difficult because managers have more control and better information over the firm's activities than the investors who provide the funding. Managers may use the funds for their own private benefits or they may take excessive risks that harm some or all investors. With a bank, the difficulty is compounded by the fact that certain assets, e.g., loans to small businesses, are particularly opaque and difficult to assess from the outside. Other assets may be easy to assess because they can be traded in liquid markets, but this very tradability provides managers with the scope for reshuffling the bank's positions quickly, to their own personal advantage and possibly to outside investors' disadvantage.⁴⁵ Unless the governance problems are effectively addressed, funding may become inefficiently low or expensive.

The academic literature includes two types of arguments as to why debt funding might be superior to equity funding for solving governance problems in banking.

- Debtholders have hard claims, which impose discipline on managers because if proscribed payments to debtholders are not made, there are legal consequences.
- Deposits and short-term debt that must be frequently renewed discipline managers because of the fear that, if managers misbehave, creditors will withdraw their funding, causing a "run."

⁴⁵ Opaqueness as a natural by-product of the bank's own activities in monitoring its loan clients is discussed in Diamond (1984), while the "paradox" of asset liquidity as enhancing transparency while expanding the scope for manipulations by bank management is the subject of Myers and Rajan (1998). More generally, models where debt contracts emerge as optimal are more appropriate for describing why the banks themselves structure their financing of the businesses they loan to in the form of debt contracts. (Such models are sometimes called "costly state verification" models.) As we argue, these models do not imply that debt or high leverage are optimal as the way to finance the banks themselves, particularly in the context where such leverage produces systemic risk.

In this section we review these arguments. The first argument applies to all firms, whereas the second has been developed specifically to explain the specific way banks are funded with deposits and large amounts of short-term debt, which creates the possibility of runs. Underlying this discussion is the deeper issue whether observed financing patterns should be regarded as being efficient simply because these are the financing patterns that markets have developed.

As discussed in Sections 4.3-4.4, the observed financing patterns of banks may reflect debt overhang and leverage ratchet effects and the inability of banks to commit to specific levels of borrowing, rather than any benefits that debt finance brings to the resolution of conflicts of interest. Thus, the choice may not even be privately optimal for the banks' investors, instead reflecting the conflicts of interest between shareholders and existing debtholders once debt is in place. If the debtholders anticipate the problems and adjust initial loans conditions accordingly, shareholders themselves may effectively be the losers. In this situation, statutory equity requirements, i.e. government intervention in private contracting, may actually provide a substitute for the missing ability to commit and thereby improve on ineffective private contracting even from the collective perspective of all the investors involved (depositors, other creditors and shareholders).

5.1 Does the Hardness of Creditors' Claims Provide Managerial Discipline?

"Debt is valuable in a bank's capital structure because it provides an important disciplining force for management." (French et al. 2010, p. 55)

"Equity investors in a bank must constantly worry that bad decisions by management will dissipate the value of their shareholdings. By contrast, secured short-term creditors are better protected against the action of wayward bank management." (Kashyap, Rajan and Stein (2008)).

Statement: "Reliance on significant amounts of debt is necessary to prevent bank managers from mismanaging the firm."

Assessment: This statement ignores the fact that the use of debt generates and exacerbates additional governance problems, and these problems can be quite severe. Debt is also not unique in its ability to provide discipline; alternative mechanisms exist that allow equity capital to be increased without sacrificing the potential governance benefits of debt.

The hardness of creditors' claims has the advantage that, *as long as the bank is able to satisfy these claims*, they are easy to enforce. Moreover, since creditors' claims are independent of how much the debtor earns, such claims do not dilute the debtor's incentives to invest effort in order to raise his earnings. As long as the bank is doing well, debtholders need not worry much how the bank's management behaves or whether the management's business reports are to be trusted. By contrast, outside shareholders have many reasons to worry. This so-called "free cash flow" problem can be particularly severe in mature companies whose managers may find too few profitable investment opportunities in their own area of expertise and therefore look to diversify

into other areas.⁴⁶ These considerations are sometimes seen as supporting the view that the governance problems associated with debt finance are less serious and less costly than the governance problems associated with equity.⁴⁷

However, the conditioning statement “*as long as the bank is able to satisfy these claims*” in the preceding paragraph hides the fact that debt funding in fact generates and often exacerbates frictions and governance problems, and that the governance problems that arise with extensive use of debt can be more serious and harder to alleviate than those potentially associated with equity funding. Because of the limited liability of equity, debt gives rise to potential default and insolvency. If default is likely, the debtor’s behavior may be highly distorted. If default has already occurred, sorting out the borrower’s assets to determine what the lenders get is usually quite costly.⁴⁸

As already mentioned, once debt is in place borrowers generally have incentives to take excessive risks at the expense of creditors. If risks are taken, creditors do not participate in the high returns in the event of success, but they are burdened with the increased risk and increased costs of default.⁴⁹ By contrast, managers and owners (or shareholders) benefit from the high returns in the event of success but do not suffer from increases in insolvency costs, since their liability is limited. The phrase “heads, I win, tails, the creditor or the taxpayer loses” captures the essence of a problem that has led to many banking crises of the past.⁵⁰ This problem, which is more likely if managers are compensated based on shareholders’ returns, is more pronounced the

⁴⁶ On debt as a device to mitigate diversion of company resources for the private benefits of management, see Jensen and Meckling (1976) and Hellwig (2009a). The notion that debt is informationally undemanding is discussed by Townsend (1979), Diamond (1984), Gale and Hellwig (1985), Gorton and Pennacchi (1990), and Dang, Gorton, and Holmström (2012). Debt as a solution to the free-cash-flow problem is discussed by Jensen (1986, 1989, and 1993).

⁴⁷ A more complicated argument is provided by Dewatripont and Tirole (1994a, b, 2012). Their analysis suggests that the mix of debt and equity finance of any corporations should be designed in such a way that subsequent information is best used. Because debt holders and shareholders have conflicting interests, with debt holders typically more risk averse than shareholders, it is desirable to have debt holders in charge if intervening information, e.g., the development of current profits, suggests that a conservative decision, such as closure of the bank should be taken, and to have shareholders, or management acting on behalf of shareholders, in charge if the intervening information suggests that a more daring decision, such as continuation or even expansion of activities is appropriate. Dewatripont and Tirole (1994b) call for banking regulation and supervision as a mechanism to solve the free-rider problems of debt holder control when there are many small depositors lending to the bank (and a run is deemed to be undesirable because of its fallout for the rest of the economy). Their work assumes that there are both short-term and long-term creditors, with default to short-term creditors triggering a change of control and long-term creditor interests affecting decision making after the change of control. Potential conflicts of interest between the two are not addressed.

⁴⁸ Beyond direct costs, there are generally significant indirect costs of financial distress and bankruptcy due to operational disruptions, as well as significant social costs imposed upon outside parties.

⁴⁹ These burdens are borne by the taxpayer to the extent that creditors are bailed out by the government when things go badly.

⁵⁰ On excessive risk taking, see Jensen and Meckling (1976), Stiglitz and Weiss (1981); in the context of banking, disastrous examples are provided by the German banking crisis of 1931 (Born 1967, Schnabel 2004, 2009) and the American Savings and Loans Crisis of the eighties (Dewatripont and Tirole 1994b, Kane 1989, and White 1991). In the latter crisis, the deregulation of the early eighties permitted *gambling for resurrection* by institutions that would have been declared insolvent if fair value accounting had been properly applied. Haldane, Brennan, and Madouros (2010) argue that observed increases in ROE are not necessarily a measure of increased value brought about by banks, but are more likely the result of risk taking strategies by banks. This is consistent with the suggestion that “risk shifting” is a significant problem in highly leveraged financial institutions.

more highly leveraged the firm is. It is therefore particularly significant for banks with their extraordinarily high leverage.

The problem of excessive risk taking is compounded by the fact that risk taking may benefit shareholders at the expense of creditors or taxpayer. Shareholders may therefore have little or no interest in disciplining managers to avoid risk, and they might even be complicit in undermining mechanisms to do so.⁵¹ The problem is also exacerbated if creditors are insured explicitly (as depositors are), or can count on being bailed out by the government and therefore do not attempt to impose discipline in the form of covenants to debt contracts or by charging higher interest to reflect the harm they expect. Management, acting on behalf of shareholders, has strong incentives to engage in strategies that yield high returns when successful and negative returns when unsuccessful, increasing the likelihood and the extent of distress and insolvency.⁵²

With non-financial firms, the governance problem of excessive risk-taking is not so severe. First, because overall leverage is much lower, the incentives to engage in excessive risk taking are generally much weaker. Second, debtholders impose restrictive covenants, monitor these covenants and intervene if the covenants are broken. Quite often, these debtholders are financial institutions with significant holdings so that there is no question about their incentives (and ability) to engage in the requisite monitoring activities.

Matters are different for banks for four reasons. First, banks' leverage is much higher than that of most other firms. Second, banks' creditors tend to be more dispersed so that the public-good aspects of management discipline generated by monitoring are more important. Third, depositors who are insured do not have an incentive to spend resources on monitoring. These features of bank finance reflect the fact that bank deposits provide an important "money like" transactions function in the economy, with many small depositors caring about the convenience of having funds available for transactions and being unable or unwilling to engage in effective monitoring. Fourth, bank creditors whose claims are implicitly guaranteed by the government, e.g. creditors in "too-big-to-fail" institutions, also have reduced incentives to monitor.

The assessment that debt is valuable because it imposes discipline must therefore be viewed in proper context. Those who point to potential positive incentive effects of debt funding, such as French et al. (2010) or Kashyap, Rajan and Stein (2008), ignore the potential negative incentive effects. A proper analysis must consider the all the incentives produced by debt funding, both positive and negative. Along these lines we observe that non-financial firms, faced with many of the same tradeoffs, routinely choose substantially lower levels of leverage than financial firms, yet we know of no evidence that they are more poorly governed.⁵³

We also question whether the so-called "free cash flow" problem, which focuses on management's ability to withhold cash from shareholders and engage in wasteful investment, is the primary governance problem to which banks are exposed. In fact, the governance problem

⁵¹ Bolton, Mehran and Shapiro (2010) develop a model that includes shareholders, debtholders, depositors and an executive in which this problem can be seen. They propose debt-like compensation schemes that might be helpful. Note, however, that if managers seek high return or to try to achieve a target ROE, shareholders may be exposed to more risk than they are compensated for. (See Admati and Hellwig (2013, Chapter 8.)

⁵² Bhagat and Bolton (2010), and Bebchuk, Cohen and Spamann (2010) show that incentives created by executive compensation led to excessive risk-taking by banks in the years leading to the financial crisis. Bebchuk and Spamann (2010) propose regulating bankers' pay in light of this problem.

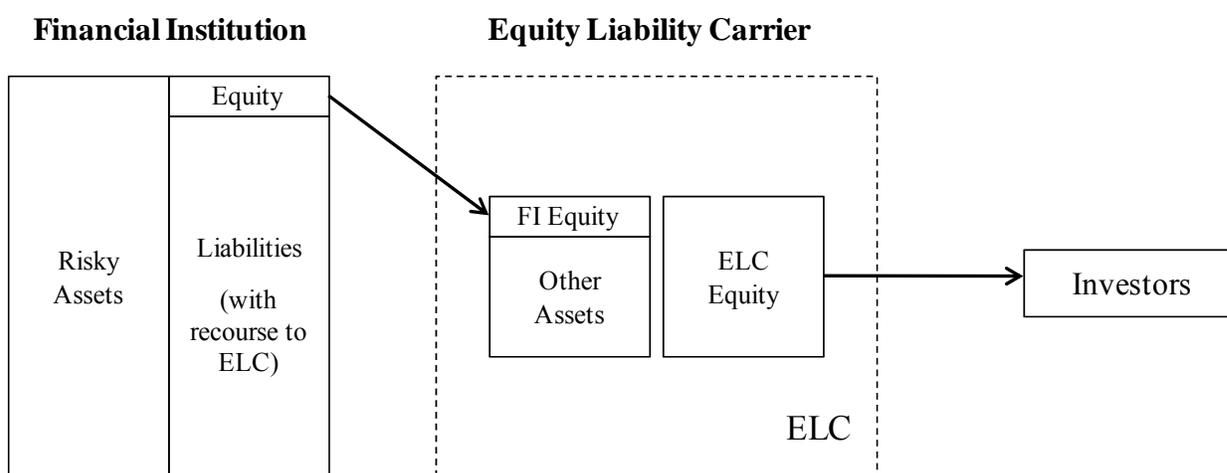
⁵³ On average, U.S. non-financial firms have maintained more than 50% equity historically.

that is often alluded to when discussing financial firms in the popular press is not one that debt may solve. Rather, it is the problem of excessive risk taking, which is exacerbated when leverage is increased.

Finally, it is not at all clear debt is the only way of providing managerial oversight for financial institutions, let alone the most efficient. Fundamentally, managerial incentives are driven by compensation and retention schemes. Capital structure appears to be a rather crude instrument to provide such incentives, and one fraught with socially costly indirect consequences. If managerial oversight is the main motive for high bank leverage, then we would argue that policy makers should focus attention on supporting improved or alternative governance mechanisms, rather than continue to rely on the use of socially-costly high levels of leverage.

As an example of one possible mechanism, consider the proposal of an Equity Liability Carrier (ELC) for financial institutions, introduced by Admati, Conti-Brown and Pfleiderer (2012). The structure is illustrated in Figure 3.

Figure 3: Increasing Cushions through a Separate Equity Liability Carrier



Under the ELC, existing bank equity, along with additional equity capital associated with increased requirements, are held in a separate holding company with governance that is independent of the bank itself. While the bank’s creditors have recourse to the ELC assets, bank managers do not.⁵⁴ In this way, bank managers continue to operate under the “discipline” of high leverage, but the ultimate costs of a default are largely absorbed by the ELC. As owners of the bank’s equity, the ELC board and its shareholders have a vested interest monitoring and ensuring the bank is efficiently managed (and given their exposure to the bank’s liabilities, they will guard against risk-shifting as well). As explained in Section 7 below, there is no reason that such a structure, or for that matter additional equity held directly by banks, would have a meaningful impact on the portfolio holdings of final investors.

⁵⁴ Note that the equity of the financial institution is not held publically. Instead it is held by the ELC. The ELC is 100% financed by equity that is publically held by investors.

Other mechanisms are surely possible. Rather than rely on mandatory interest and principal payments to provide discipline, well-capitalized banks could, for example, commit to a level of equity payouts, which, if not maintained, would trigger a shareholder vote to replace incumbent management. Such a mechanism would seem to provide virtually equivalent discipline without the costs of leverage, unless the commitment mechanism could be easily undermined by management.⁵⁵ In that case, government policy could and should be directed toward strengthening corporate governance practices to allow for such commitment, rather than continue to allow high leverage.

5.2 Does the Threat of Runs Provide Effective Discipline?⁵⁶

“Capital requirements are not free. The disciplining effect of short-term debt, for example, makes management more productive. Capital requirements that lean against short-term debt push banks toward other forms of financing that may allow managers to be more lax.” (French et al. 2010, p. 44)

“Banks finance illiquid assets with demandable deposits, which discipline managers but expose them to damaging runs.” Diamond and Rajan (2012)

Statement: “Fragility is beneficial for disciplining bank managers. Banks use a fragile funding mix involving deposits and short-term debt in order to discipline their managers by the threat of runs.”

Assessment: This statement is false because the models on which it is based are implausible and ignore critical elements of reality. Because runs can be very costly and inefficient, deposit insurance and guarantees, put in place to prevent runs, serve to blunt any motives depositors to engage in monitoring. In addition, as mentioned in Section 5.1, the statement ignores the governance and conflicts of interests that arise from high leverage and a fragile funding mix.

Beyond being a hard claim, the potential disciplining effect of debt is claimed to be enhanced whenever debt contracts can be withdrawn on demand or must be repeatedly renewed. (A similar argument applies when long-term debt must be renewed.) The presumption is that, in fear for their money, creditors will monitor the activities of their bank and, if they see something that they don’t like, they will refuse to renew their loans. It is further assumed that management will refrain from doing anything that might annoy the creditors in order to avoid the difficulties created by a failure to have the bank’s loans rolled over.

Calomiris and Kahn (1991), for example, have argued that the “on demand” clause in certain deposit contracts serves to impose such discipline on bank management. Diamond and Rajan

⁵⁵ It is important to recognize that none of the existing literature considers such mechanisms. Indeed, any effective governance by equity holders is generally ruled out *ex ante*, with the objective of establishing the *potential* role of debt in providing discipline. That debt *uniquely* satisfies this role is a much stronger statement, and one that to our knowledge is completely unsupported.

⁵⁶ Much of the discussion in this section is also covered in Admati and Hellwig (2013b).

(2000, 2001, and 2012) argue that the threat of a run by a bank's depositors prevents the banker from demanding more compensation for collecting on the bank's loans (i.e., it solves a "hold-up" problem) and at the same time can make the banker tougher in his negotiations with his bank's borrowers.⁵⁷ All of these models assume that depositors are not insured and are vulnerable to actions taken by the bank manager. Since most deposits are insured and insured depositors have no incentives to engage in the requisite monitoring and are not likely to run, Calomiris (1999) has suggested that banks should issue additional debt – subordinate to any deposits and crucially, *uninsured*– to fulfill the disciplining role that depositors fail to supply.⁵⁸

Any theory of the disciplining role of short-term (or renewable) debt must come to terms with the observation that, in the years leading up to the financial crisis of 2007-2008, there was a large expansion of short-term debt of banks. This debt finance, much of it in the form of repo contracts, was provided and repeatedly rolled over without any indication of debtholders exerting discipline. As documented by Adrian and Shin (2010), leverage at leading investment banks reached a peak towards the end of 2007, long after the crisis had broken into the open. By this time asset holdings from subprime mortgage securitization were firmly in place (i.e., the proverbial skeletons were already in the closets).

In the 2007-2009 crisis, short-term debt finance broke down. Short-term funding was withdrawn from conduits and structured investment vehicles in August 2007, from Bear Stearns in March 2008, and from Lehman Brothers in September 2008. These reactions did have serious consequences for the affected banks. However, given the unchecked buildup of positions prior to July 2007, it is difficult to think of these events as an instance of effective discipline of short-term lenders over bank managers. Indeed, the breakdowns of short-term funding appeared to be driven by public information rather than information acquired by the monitoring carried out by short-term lenders. The August 2007 breakdown of conduit refinancing through asset-backed commercial paper was triggered by the substantial downgrades of Mortgage Backed Securities (MBS) and Collateralized Debt Obligations (CDOs) by the rating agencies, and by the insolvencies of two Bear Stearns Hedge Funds. The breakdowns of repo refinancing for Bear

⁵⁷ One can reasonably question how important hold-up problems of the sort modeled in Diamond and Rajan (2000, 2001, and 2012) actually are in modern banking and how significant the threat of a run would need to be to mitigate these hold-up problems if they are important. Consider what happened to JP Morgan in the so-called "London Whale" scandal of 2012. The trading losses amounted to \$6.2 billion, but notably these huge losses did not create a run on JP Morgan. One reason they did not is that while these losses are huge in absolute terms, they were not large enough by themselves to create panic among creditors given JP Morgan's overall financial position at the time. What this suggests is that the managers of JP Morgan at that time could have "held up" the investors in JP Morgan for an additional \$6 billion in compensation without triggering a run. Much more "fragility" would be needed to prevent them from doing so. Quite obviously if there is potential for a significant hold-up issue, other things prevent the managers of JP Morgan from holding-up its investors.

⁵⁸ Similarly, Poole (2010) suggests that discipline can be delivered by staggered tranches of junior, long-term debt that must be renewed, e.g. ten-year debt with 10% coming due each year. Whereas our preceding discussion has pointed to the fact that high leverage itself provides incentives for excessive risk taking, Calomiris (in the quote given above) suggests that even this moral hazard is eliminated by debt holders engaging in monitoring so as to penalize the bank if it takes on too many risks. Calomiris and Poole both suggest that the shrinkage of the balance sheet that would result from long term debt refusing to renew the debt is a better disciplinary device than regulators can otherwise achieve. Note that even if one concludes that subordinated debt has some useful role to play, additional equity can still be added to the balance sheet, essentially placing it on top of the "useful" subordinated debt and other liabilities. This will reduce risk and the incentives for risk-shifting, all without reducing the disciplining function the subordinated debt might play.

Stearns and Lehman Brothers were triggered by asset price declines, in particular, in these institutions' share prices. None of these instances suggests that debt-holder monitoring played an effective disciplining role of its own.

In addition to recent history, there are conceptual reasons to doubt the effectiveness of “debt renewal” as an optimal disciplining mechanism. Absent insolvency or market failure, debt can always be renewed at a sufficient yield. In that case, the only potential disciplining effect can come from the information that is provided when the debt is repriced. Any actual discipline for managers must still come through shareholders. And while there is potentially valuable information to be learned from the occasional repricing of the firm's debt, it is important to recall that the firm's equity is repriced on a daily or hourly basis, and generally provides even more information regarding the performance of the firm.⁵⁹ Because debt is informationally less demanding than equity, as long as debtholders believe that the bank is going to fulfill its obligations, they don't care how the bank is doing; in contrast, shareholders always care about the extra million dollars that the bank may be earning or losing. For this reason, monitoring incentives for shareholders with respect to the problem of waste and “free cash flow” are much stronger than for debtholders.⁶⁰ Moreover, debtholders may forego their own monitoring if they believe that they are protected by marketable collateral or government guarantees, or if they believe that stock prices provide enough of a clue as to where the bank is going.

Thus, debt only directly provides true discipline in the extreme scenario in which refinancing the debt is infeasible due to clear insolvency, or sufficient uncertainty regarding insolvency to induce market failure – a run on the bank. In this regard short-term debt finance also has a significant cost. The presumed disciplinary mechanism relies on uncoordinated behaviors, introducing an element of fragility into the system so that there is a positive probability of distress and inefficient destruction of asset values. Each lender's interest to be first in line if things go wrong may lead to a run taking place simply because each participant fears that the other participants are running. If the bank's assets are illiquid, such a run may result in an inefficient liquidation. The intervention of the short-term debtholders may thus impose large costs on the bank. As recent experience has shown, especially that related to the Lehman bankruptcy, there may be even larger costs for the rest of the financial system and the overall economy.

In the literature on the disciplinary role of short-term debt finance, the problem of fragility has been downplayed, even as the suggested mechanisms rely on fragility to deliver the discipline. The suggestion that short-term lenders may start a run merely because they expect others to do so, as in Diamond and Dybvig (1983), has been countered with the observation that, empirically, runs and other breakdowns of short-term refinancing are triggered by adverse information and should therefore be interpreted as a way of processing that information, possibly

⁵⁹ It might be objected that share price levels do not provide direct information about the riskiness of the bank's assets, an item of concern for regulators and creditors, especially uninsured creditors. It should be noted, however, that the volatility of stock prices gives information about the riskiness of the assets. In addition, option markets exist for the publically traded equity of most large banks and option pricing reveals the market assessment of risk levels.

⁶⁰ Indeed, discipline from shareholders plays a potentially strong role when management incentives are linked to shareholder value; see Holmström and Tirole (1993).

even one that is efficient.⁶¹ In this view, fragility may be an unavoidable consequence of the fact that the debtholders' information is noisy. In other words, the possibility that a breakdown of short-term refinancing of a bank may be the result of self-fulfilling prophecies in the strategic interaction between different debtholders is not eliminated when the debtholders' behaviors are driven by their information.⁶² Thus, we cannot accept the view that the mechanism of market discipline by short-term debtholders is at all efficient.⁶³

It is important to observe that fragility is essential for the disciplining mechanism that short-term debt is presumed to provide.⁶⁴ However, because of the potential inefficiencies involved in fragility, regulators often seek to avoid the socially costly consequences of fragility through bailouts or other subsidies. But while bailouts may be justified *ex post*, knowing that they are probable *ex ante* works to undermine any discipline the leverage was intended to provide. Finally, it should be observed that virtually all proposals in the capital regulation share the objective of reducing fragility, thereby in fact undermining any capability, should it exist, for fragility to impose discipline.

In sum, we do not find theoretical or empirical justification for the proposition that high leverage plays a necessary, significant positive role in the governance of large financial institutions. Given that the disciplinary benefits are not apparent, are likely to be small, and potentially can be achieved in other ways, and given the large social costs of highly leveraged and fragile banks, the disciplining argument is in our view not a reason for regulators to avoid imposing high equity capital requirements. Indeed, as we noted in Section 3.1 (and as will be discussed in further detail in Section 7), additional equity can be added to banks' capital structure *on top of existing deposits and any "useful" subordinated debt*. Doing so will further reduce incentives for excessive risk taking on the part of shareholders.

Contrary to the notion that short-term debt disciplines bank managers, the ability of banks to continue borrowing because of a combination of the leverage ratchet effect and the fact that depositors and short-term bank creditors do not impose conditions to prevent repeated borrowing means that the fragility of banks is in fact the result of *lack of discipline*. In other words, the observed high leverage of banks may reflect the leverage ratchet effect discussed in Section 4.3 and the inability of banks to commit to limiting their future borrowing, rather than any benefits that debt finance brings to the resolution of conflicts of interest.

⁶¹ For theoretical analyses, see Chari and Jagannathan (1988) and Jacklin and Bhattacharya (1988). For an empirical assessment, see Calomiris and Gorton (1991).

⁶² For example, the model with multiple debt holders in Calomiris and Kahn (1991) exhibits multiple equilibria, an equilibrium with all depositors running even though information is good, as well as an equilibrium with no depositors running. In some models in which monitoring provides debt holders with private information, the equilibrium is unique, but may be excessively sensitive to the information that is available. However, in the presence of a public signal, such as the bank's stock price, equilibrium in these models may not even be unique, i.e., fragility due to multiple self-fulfilling prophecies may be an issue. See Morris and Shin (1998), Rochet and Vives (2004), Goldstein and Pauzner (2004), C. Hellwig (2002) and Angeletos and Werning (2006).

⁶³ In Rochet and Vives (2004), individual information is noisy and aggregate information is not, but the withdrawal mechanism is ill suited to provide for an efficient use of the aggregate information.

⁶⁴ Fragility is essential to solve the information acquisition free-rider problem among debt holders, because it provides an incentive to collect information so that they can be first in line when things go wrong, benefitting at the expense of debt holders who are later in line. The lack of co-ordination among creditors that raises the possibility of a run is thus an integral part of the mechanism.

6. Is Equity Socially Costly because it Might be Undervalued when Issued?

“The reason equity capital has a higher cost than other sources of funding.... is due to asymmetric information and information dilution costs That is, when a bank decides to raise additional equity through a seasoned offer, the market tends to undervalue the issue for the better banks.” Bolton and Freixas (2006, p. 830).

Statement: “Raising equity is costly because with asymmetric information, investors are unwilling to pay a price equal to what the new shares are worth.”

Assessment: The statement is false. While the asserted costs may exist for some modes of raising new equity, equity can also be increased by retaining earnings, where problems of asymmetric information do not arise. Alternatively, new shares can be issued through a rights offering, thereby avoiding shareholder losses from under-valuation. Finally, costs associated with information asymmetry are can be reduced if managers have little discretion and must respond to pre-specified regulatory requirements.

The proposition that it is costly to issue new equity, because of information asymmetries is often based on Myers and Majluf (1984). Myers and Majluf consider a situation in which management has better information about a corporation’s prospects than market investors, including the corporation’s own shareholders. They suggest that management will be reluctant to issue new equity if it believes that the equity is undervalued. If investors realize the adverse selection in issuance, they will pay less for new shares issues so that, in an extreme situation, every corporation, except for the ones with the worst prospects, might refrain from issuing new equity to fund new investments.

This analysis, however, does not establish that asymmetric information makes the use of more equity and less debt funding more costly. The analysis specifically does *not* apply to equity increases achieved by retained earnings. Indeed, the so-called *pecking order theory* of corporate finance that Myers and Majluf establish asserts that retained earnings are a cheaper source of funding than debt because they give rise to *fewer* information problems. In other words, the pecking order does not predict that all firms should be highly levered – to the contrary, it is often used to explain low leverage firms.

Moreover, the negative signal associated with equity issues demonstrated by Myers-Majluf can be avoided by eliminating managerial discretion over the additional funding.⁶⁵ If increased equity requirements are accompanied by regulation mandating that all banks issue new equity at a pre-specified schedule, the “stigma” associated with equity issuance would be removed. In this case, the market would value shares according to some average over the different possibilities, and the result would be that some shareholders find the new equity to be dilutive and others

⁶⁵ Recall that in the original implementation of the Troubled Asset Relief Program (TARP) in 2009, the government did not give large banks the choice of whether to accept government investment or not, so as to mute any information that might be gleaned from the choices made by the banks.

would welcome the fact that the shares were sold for a good price; that is, undervalued banks would subsidize overvalued banks. The observation by Myers and Majluf (1984) that managers may be reluctant to issue new equity if they believe it is undervalued is therefore not the same as the statement that a funding mix with more debt raises total costs to firms or to society.

Finally, even for an individual firm, the Myers-Majluf cost of equity can be avoided by issuing shares through a rights offering. In this case, even if the shares are under-valued when issued, the gain from purchasing those shares will flow to the firm's own shareholders and will therefore offset any dilution of their existing shares.

That said we should recall that, as discussed in Section 4.3 and in Admati et al. (2013), reducing leverage will be resisted by existing shareholders (and managers working on their behalf) whether or not new equity is issued. This resistance, however, is not due to issues of asymmetric information but to issues of redistribution between shareholders and creditors (or tax payers). Most importantly, the cost to shareholders is entirely a private cost based on being able to benefit at the expense of creditors or taxpayers when there is less equity in the mix. Thus, it does not establish any *social* cost to increased equity requirements.

An important observation is that if banks were better capitalized, they would tend to have more retained earnings available to fund new investments, since they would be required to pay out less in interest payments. With more earnings, banks could expand lending activity more rapidly without the need to raise external capital, which might involve issuing undervalued securities. Not only will better capitalized banks have less to pay out in required interest payments, they will also have reduced incentives to pay large dividends. This is because the more highly leveraged a bank is, the more the equity holders gain (at the expense of debtholders or those guaranteeing the debt) from a given cash payout to equity.⁶⁶ The lowered incentives to pay dividends in better capitalized banks will lead to more retained earnings.

Note also that if a bank does issue equity, the cost associated with any underpricing of equity is likely to be lower when a bank has more equity. As we have shown in Section 3, with lower leverage, the sensitivity of the value of equity to the value of the bank's underlying assets is smaller. Thus, if investors undervalue a bank's assets, the underpricing of its equity will be lower in percentage terms when the bank has more existing equity than in the case where it is highly leveraged. In that sense, managers and equity holders of better capitalized banks would find that the cost of raising external funds are not as significant as they would be if the bank were highly leveraged.⁶⁷

⁶⁶ In our view (and in the view of many others), the U.S. government should not have allowed large banks to continue paying dividends while at the same time providing TARP funds to recapitalize these institutions and encourage lending. Banks in England, by contrast, were forbidden from paying dividends during this period.

⁶⁷ More precisely, for a given dollar amount of equity raised, the cost from underpricing will be lower with higher capital. If the bank raises both equity and debt in the same proportion as its original capital structure, then the cost from underpricing will be independent of capital structure.

7. Increased Bank Equity, Liquidity and the Big Picture

“Creation of information-insensitive debt is the function of the banking system.”
Gorton (2010 p. 27).

“High bank leverage is the natural (distortion-free) result of intermediation focused on liquid-claim production.” DeAngelo and Stulz (2013 p. 2).

Statement: “Bank debt is valuable because it is highly liquid and informationally insensitive.”

Assessment: The liquidity properties of bank debt and its “information insensitivity” — the term used by Gorton (2010) to capture the benefits of liquidity — are very useful properties. However, this does *not* imply that it is socially beneficial for a bank to be highly leveraged. In fact, when a bank is highly leveraged, the lack of a significant equity buffer can cause the informational sensitivity of the debt to increase, thus harming its liquidity. Therefore, higher equity requirements *benefit* rather than interfere with liquidity provision.

The value of a security depends on the cash flows that it is expected to pay. These payments depend on the nature of the security’s claims and on the issuer’s ability and willingness to pay. The latter in turn depend on the issuer’s assets and the returns they generate. If the payments to a security holder are highly sensitive to changes in the issuer’s earnings or the value of the assets the issuer holds, any assessment of the security will require a lot of information about the issuer and his assets, making the security *informationally sensitive*. By contrast, if payments are insensitive to changes in the issuer’s earnings or the value of the assets it holds, the assessment will not require a lot of information and in this case the security is considered *informationally insensitive*.

Debt is informationally insensitive if the possibility of default is remote. *In the absence of default*, the debtholder will receive the amount he is owed, regardless of what the issuer’s earnings are. This information insensitivity can make debt a liquid asset. If the holder of the debt security needs to raise cash, he can easily sell it for its full value because the prospective acquirer knows this value. In particular, prospective acquirers need not be concerned that the seller is using superior information to take advantage of them.⁶⁸ Debt can also be liquid because it is very short-term, and the debtholder can pull his money out, by making a withdrawal or refusing to renew a loan.

⁶⁸ See DeMarzo and Duffie (1999) for a formal model showing debt is an optimal ex-ante security design that minimizes ex-post liquidity costs for an informed seller. DeMarzo, Kremer, and Skrzypacz (2005) establish a similar result in the context of informed and competing buyers. The intuition for these results is that debt’s payoff depends on the lowest cash flow realizations, whose likelihood is least impacted by new information. A related argument for the efficiency of debt is based on costly state verification, as debt minimizes expected verification costs; see Townsend (1979), Gale and Hellwig (1985). In both cases, the stipulation of a fixed payment that is to be made whenever it is feasible to do so, keeps the dependence of the security holder’s claims on the issuer’s earnings to the very minimum that cannot be avoided because in some eventualities, the issuer is actually unable to pay. These models, however, do not capture all of the important issues that must be considered in determining how financial institutions should be funded.

Information insensitivity breaks down, however, and liquidity may freeze when there is a significant prospect of default. In this case, investors must worry whether the issuer's earnings will be sufficient to service the debt. Such worries may lead to the debt security being illiquid, i.e., prospective buyers are so worried that a seller might have superior information that they are unwilling to buy the security at the price at which the seller would be willing to sell it.⁶⁹ Similarly, short-term debt, such as uninsured deposits, stop being liquid when the bank goes into bankruptcy and all claims are frozen.⁷⁰

Some authors see the role of banks in the economy as that of transforming informationally sensitive and therefore illiquid loans made to various borrowers into informationally insensitive and therefore liquid claims that are eagerly demanded by final investors. Gorton (2010) stresses the welfare-enhancing effects of liquidity creation. DeAngelo and Stulz (2013) stress the profitability of liquidity creation for banks and argue that, to maximize the benefits from liquidity creation, banks should fund only by liquid claims such as deposits.⁷¹ In their view, higher equity requirements for banks are considered undesirable because such requirements impose a constraint on the creation of liquid debt by banks.

There are three problems with this view, however. First, no account is given of the costs associated with liquidity creation. Many services that are associated with deposits, such as ATMs or payments, require real resources. Once these real resource costs are taken into account, efficient deposit levels are likely to be bounded, and, above a certain level, savings are likely to exceed efficient deposit levels. Banks, as well as other firms, will then choose to fund with other securities, such as shares and bonds, in addition to deposits. In that situation, there is no reason why a higher equity requirement should come at the expense of deposits and other liquid claims.⁷²

Second, no account is given of the potentially liquidity-enhancing role of equity in a world of uncertainty. While claiming that they allow for uncertainty, DeAngelo and Stulz (2013) provide a formal analysis only for the case of certainty. With uncertainty, there is a chance that the bank will not be able to fulfill its obligations to the holders of deposits and other presumably liquid

⁶⁹ According to Gorton (2010), this is precisely what happened in the markets for mortgage-backed securities in the summer of 2007.

⁷⁰ Even when there is a non-negligible prospect of default, it is still the case that, among all the conceivable claims that might be issued to outside investors, debt is the one that is least informationally sensitive. Dang, Gorton, and Holmström (2012) argue that, since any other security that might be issued would be more likely to induce securities markets to break down because of adverse selection, debt finance is socially desirable. The notion of market breakdown here is a version of Akerlof's (1970) famous "lemons problem."

⁷¹ As pointed out in Hellwig (2013), DeAngelo and Stulz (2013) suffers from a failure to provide an analysis of equilibrium as opposed to an analysis of bank optimization at parametrically given price constellations. The price constellations they use for studying bank optimization are incompatible with competitive equilibrium; they neglect the possibility that the benefits from liquidity creation by banks may be appropriated by investors (or by the borrowers whose debts provide the backing for these claims) rather than by the banks themselves. The paper is in conflict with the basic insight from elementary microeconomics that, in competitive markets, producers appropriate producers' surplus and do not draw any immediate profits from the benefits they provide to their clients.

⁷² For a version of the DeAngelo and Stulz model without uncertainty, Hellwig (2013) shows that the all-deposit-finance solution of DeAngelo and Stulz is an equilibrium if savings are small enough so that if all savings are placed into deposits, the marginal liquidity benefits of additional deposits exceed the marginal costs. If savings are larger, deposits are fixed at the efficient level and the excess savings go into shares and bonds, with a version of the Modigliani-Miller argument implying that the equilibrium mix of the two is indeterminate.

claims. In that case, these claims will cease to be liquid. They may be frozen in bankruptcy procedures (without deposit insurance), or they may become unsalable because potential buyers are afraid that a seller with superior information might be taking advantage of them. When there is a risk of default, debt, which is in principle informationally insensitive, may become informationally *sensitive* and illiquid. Such problems are less likely to arise if the bank has more equity. Because the additional equity provides for greater loss absorption capacity, the set of outcomes where liquid claims become illiquid is reduced.⁷³

Third, no account is given of the potential for self-deception in the creation, marketing, and acquisition of “liquid” debt. According to Gorton (2010), the development and expansion of securitization, as well as the expansion of the so-called shadow banking system that engaged in this business were socially useful because they served to meet the large demand for such securities, more precisely for the benefits that investors would derive from the high liquidity of these securities.

We see strong reasons, however, to question the social value of much of this debt creation.⁷⁴ As we pointed out in Hellwig (2009), the misalignment of incentives in mortgage origination and securitization that was induced by limited liability induced significant social costs; the problems were exacerbated because the banks that invested in mortgage-backed securities counted on being *too big to fail* and therefore did not properly watch the risks in these securities. Some of the presumed “need” for liquidity was actually due to regulation rather than economic fundamentals. Securities that were tradable in markets that were deemed to be liquid went at a premium because, under the model-based approach to capital regulation, they did not require much equity backing. Securities that were held through institutions in the shadow banking system did not require any equity backing at all; with financing coming through asset-backed commercial paper the easy salability of the assets seemed to provide sufficient insurance against refinancing risks. However, the high liquidity of these securities disappeared almost overnight when markets froze in August 2007. The systemic implications that were created by this fragility had altogether been neglected by the participants and do not much figure in the literature on liquidity creation by financial institutions.

⁷³ For a model with uncertainty, Hellwig (2013) shows that efficient liquidity provision in fact requires some funding by equity. In the simple model considered, the chosen equity ratio maximizes the *expected* value of liquidity benefits from deposits. This outcome is implemented without regulation if and only if the bank at the time when funding contracts are written can commit to the actions that it will take in all future states of the world. If there are limits to such commitments and marginal funding decisions are influenced by debt overhang, a *laissez faire* regime will result in excessive bank indebtedness and an excessive incidence of bank defaults and debt illiquidity; in this setting, regulatory requirements asking for higher bank equity will actually improve liquidity provision by banks.

⁷⁴ The demand for the deposits and informationally-insensitive securities issued by a bank depends in part on the yield that the bank offers on these securities. Because banks can obtain subsidies through increasing leverage and capturing the benefits from implicit guarantees, they potentially are able to offer higher yields on deposits and informationally-insensitive debt than they would have been able to offer without these subsidies. Doing so would increase the demand for deposits and informationally-insensitive securities beyond what it would be without these subsidies. Any evaluation of demand-driven explanations for the growth of the shadow banking system must take into account the subsidies banks received and the incentives banks had to increase leverage. Considerations such as these are consistent with supply-driven factors driving the expansion. As Acharya and Richardson (2010) discuss, much of the activities in the shadow banking system can be explained by attempts to evade capital regulation and avoid deposit insurance fees. For an attempt to “size” the repo markets through the crisis, see Krishnamurthy, Nagel and Orlov (2011).

Even if the economy has a great need for deposits and other forms of informationally-insensitive debt, there is no reason why higher equity requirements should prevent banks from serving this need and providing the socially optimal amount of deposits and informationally-insensitive debt. Recall that in Section 3.1 we showed that banks need not change their deposit base or the amount of debt they have issued in response to an increase in equity requirements. Higher equity requirements can be met with no change in the banks' liabilities in Balance Sheet C of Figure 1. A transition from the original balance sheet to Balance Sheet C involves issuing new equity and using the proceeds to purchase additional assets such as marketable securities.⁷⁵

One concern one might have in using the Balance Sheet C approach is that it might be costly or inefficient for banks to hold large positions of marketable securities that are unrelated to their core business. Among non-financial firms, however, it is common to hold cash and marketable securities.⁷⁶

The fact that they do so indicates that, at least for them, the private benefits of holding these reserves exceed the costs. If holding cushions is feasible for these non-financial firms, why can't leveraged banks also have cushions simply for the purpose of backing up their substantial debt obligations? Surely the concern that holding such securities is unrelated to core business is much less compelling for banks than for non-financial firms.

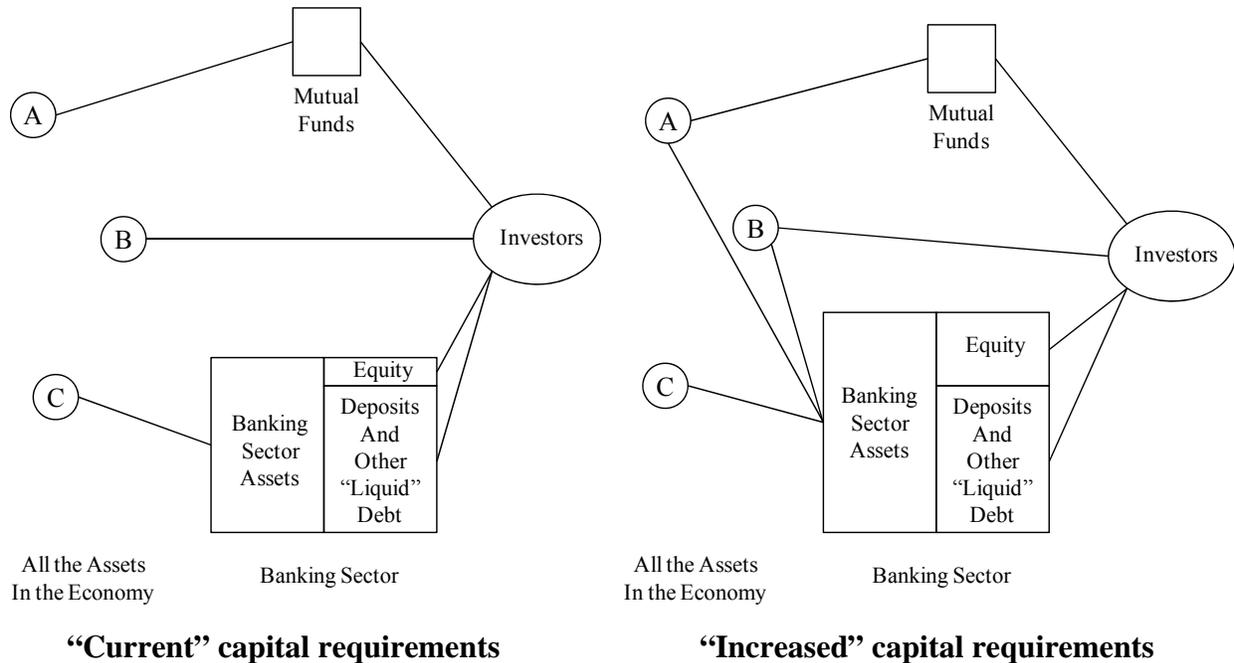
From the perspective of the overall economy, one might ask whether, economically, it makes sense for banks to issue equity in order to hold marketable securities and thus to "intermediate" the holdings of securities in the economy. Doesn't this reallocation distort the structure of the overall financial system? Figure 4 illustrates the implications of expanding the bank's balance sheet using newly issued equity to acquire marketable securities.

The left hand side of Figure 4 depicts in a simple way how assets are held in the economy. Ultimately investors (households) hold claim to all of the assets in the economy, either directly or indirectly through intermediaries. In the figure we take the banking sector to be comprised of intermediaries who provide informationally-insensitive debt through deposits and other liquid liabilities. The banking sector holds claims on some of the economy's assets (assets which we label "C" and consist, for example, of business loans and residential and commercial mortgages) and finances these holdings by issuing equity claims and debt claims (deposits and other "liquid debt"), all of which are ultimately held by investors. Other intermediaries, such as mutual funds, ETF's, private equity funds, and hedge funds, give investors indirect claims on assets but do not do so in a way that creates low-risk, informationally-insensitive claims. The assets labeled "A" are held indirectly by investors through these types of intermediaries. Finally, some assets (those labeled "B") are held directly by investors.

⁷⁵ There are two possible counterarguments. First, it might be argued that, if all savings in the economy are invested in deposits, there is no room for anything else. This statement is only true in a very special model with very special assumptions, but is not robust with respect to changes that would make the model more realistic. Second, if there is excess capacity in the market and banks are unprofitable, they may be unable to raise equity. In this case, however, the liquidity of bank liabilities must rely on a prospect of government support in case of difficulties. Such support may be unavoidable in a crisis but is highly problematic because it serves to perpetuate the excess capacity problem that is causing the crisis.

⁷⁶ For example, in 2010, cash and marketable securities accounted for more than 10% of total assets for companies such as Apple, Cisco Systems, Google, Intel, and Microsoft. DeAngelo and Stulz (2013) simply *assume* that an exogenous cost associated with the scale of the bank's assets which makes Balance Sheet C costly.

Figure 4: Asset holdings under current and increased capital requirements.



Now consider what happens if equity requirements are increased. Banks can continue to provide the same dollar amount of informationally-insensitive debt and deposits and, at the same time, meet the higher capital requirements by issuing equity and buying marketable securities (some combination of securities found in “A” and “B”). If the bank issues more equity to buy marketable securities, there is not necessarily any effect on the aggregate assets – or the aggregate production activities – in the economy. Some of the assets that investors held either directly or through other intermediaries are now held by investors through their holdings of claims on banks. Ultimately, directly or indirectly, all securities, representing claims against all assets in the economy, are held by final investors. The effect of moving from the left-hand side to the right-hand side of Figure 4 is simply to arrange the claims in a different way. Aggregate asset allocations in the economy and productive activities need not be affected. In the context of the entire economic system, expanding banks’ balance sheets in this way should not change, and in particular should not prevent, the undertaking of any and all productive activities, and it also does not need to affect the risk-return profile of the holdings of individual and institutional investors. Those who hold diversified portfolios of assets still have access to the same

combinations of risk and return, and the riskiness of bank equity, as modified by additional holdings, can be taken into account.⁷⁷

There are, however, two major benefits of the right hand side of the figure 4 over the left hand side. First, the equity cushion of the banking sector is larger on the right hand side than it is on the left. Effectively this has redistributed liability in a crisis away from the government and its taxpayers and toward bank equity holders. In doing so it has reduced systemic risk and reduced the incentives for excessive risk taking.⁷⁸ Second, as we discussed above in Section 5.1, increasing equity and lowering leverage makes debt that banks issue *more* informationally-insensitive. Because of the larger equity cushion, the bank debt on the RHS of figure 4 is, everything else being equal, more liquid and more “informationally-insensitive” than the bank debt on the LHS of figure 4.

One might ask what types of securities would banks be able to purchase if they needed to add cushions but do not have valuable loans to make. To answer this question note that between January 2008 and August 2010, the outstanding U.S. treasury debt held by the public increased by \$2.4 trillion. This increase alone represents almost 20% of the total value of assets held by U.S. commercial banks, which is approximately \$12 trillion. These new assets, among others, could be used to increase banks’ equity by as much as 16.6%. The use of marketable securities to increase the equity cushion of banks, however, does not require that all or even most of these securities be completely liquid or “safe.” The addition of any security to the bank’s balance sheet acquired using the proceeds of an equity issuance decreases systemic risk.

One objection to the approach taken above is that the expansion of the balance sheets of the banking sector through Balance Sheet C, while it reduces leverage, also increases the size of banks, at least if we measure size by total assets. In light of the problems caused by banks that are “too big to fail,” many have called for reducing the size of banks.⁷⁹ The optimal size of banks, and the extent of scale economies in this sector, is a topic of great controversy. If scale economies justify the existence of very large banks, then making the large banks safer by reducing their leverage is of critical importance. The increase in size brought about by Balance Sheet C is then justified because it reduces fragility and systemic risk. However, nothing we said above requires that any *individual* bank be large or that the industry be highly concentrated. Indeed, large banks can be split up into smaller banks, each of which could meet equity requirements through Balance Sheet C in a way that preserves the aggregate levels of lending and liquidity provision.⁸⁰

Our discussion up to this point has been exclusively focused on the costs and benefits of increasing the equity capital requirements of banks. Another important regulatory issue concerns

⁷⁷ To the extent that bank equity becomes less risky, those who would like to take on additional risk can create leverage by buying on margin, trading options in an exchange, etc.

⁷⁸ In a potential crisis situation, some of the value of the marketable securities acquired by the banks (assets in the “A” and B” groups) is received not by the banks’ shareholders but by their creditors. The loss is borne by shareholders. From a social perspective, such an outcome is much better than a default that would have severe repercussions for the rest of the financial system. In addition, the fact that the loss is borne by the shareholders and not by creditors and the government reduces ex ante risk shifting incentives.

⁷⁹ See, for example, Johnson and Kwak (2010).

⁸⁰ We envision Balance Sheet C as a way to effect the transition to higher equity requirements. As the banking sector grows organically, banks can sell the marketable assets they acquired to finance new, socially valuable loans.

liquidity requirements for banks. A full discussion of liquidity requirements is beyond the scope of this paper, but it is useful to make a few observations about liquidity in the context of our analysis of increased equity requirements. Much of the focus on liquidity needs of banks is related to the fragility associated with highly-leveraged banks that rely on short-term funding. Liquidity problems arise when short-term funding is not renewed and banks may be forced to sell assets on short notice. Liquidity is important because a liquidity crisis can lead to distress for banks that are technically solvent. For such banks a significant “reserve” of liquid assets may be prudent. Liquidity reserves become less important when banks are much better capitalized. First, even if a bank uses short-term funding, the scenarios that require liquidity (e.g. a run on the bank) become less likely when the bank is better capitalized. Second, if the bank is better capitalized, the central bank or “lender of last resort” has less reason to worry that a liquidity crisis is actually a solvency crisis. Increased equity capital thus ultimately lowers the cost of central banks providing liquidity backstops.

While we have argued that the social costs of banks using more equity to fund their operations are very small, to the extent that liquidity requirements force banks to hold cash in reserve, they would impose the opportunity cost of not receiving a higher return on those funds. Holding excessive amounts of cash, or other liquid assets whose return is low because of a liquidity premium, relative to the bank’s liquidity needs is costly because the bank pays an unnecessary liquidity premium. This inefficiency can be interpreted as a social cost.⁸¹ As discussed above, however, additional equity need not be invested in cash, and it can either be put into profitable lending or invested in marketable securities that earn market-determined returns. Because increased equity requirements can potentially reduce the need for liquidity, they may provide an additional benefit of reducing the total cost associated with the need to maintain liquidity.

8. Why Common Equity Dominates Subordinated Debt and Hybrid Securities

“We recommend support for a new regulatory hybrid security that will expedite the recapitalization of banks. This instrument resembles long-term debt in normal times, but converts to equity when the financial system and the issuing bank are both under financial stress.” French et al (2010 p. 86).

Statement: “To make sure banks recapitalize when they and the financial system are distressed, it is best that they issue long-term debt that converts to equity when needed.”

Assessment: Hybrid securities such as contingent convertibles can be used to force a recapitalization that would otherwise be resisted by shareholders. Capitalizing the bank up front with equity, however, would provide the same protection without the need for an ex post trigger.

⁸¹ For a formal treatment of the costs of inefficient holdings of liquid assets and the role of public liquidity provision, see Bolton, Santos and Scheinkman (2010)

Equity has the additional advantages of not distorting lending decisions due to debt overhang, trading in well-established liquid market, and being easy to renew via rights offerings.

Whereas our discussion so far has focused on equity and debt, in practice corporations issue many different kinds of debt, as well as securities that have some features of debt and some features of equity, so-called hybrid securities. For example, preferred stock has features of equity in that its holders may not have any claims to dividends if the corporation does not earn a profit, but it also has features of debt in that, for up to some specified amounts, payouts to holders of preferred stocks have priority over payouts to shareholders.⁸² Similarly, certain types of “hybrid” subordinated debt have contingency clauses stipulating a cut or a delay of payments if the bank is making losses.

Bank capital regulation has a long tradition of treating such hybrid securities as a form of “regulatory capital” on the basis that they can, in principle, absorb losses. The 8% “capital requirement” in the original Basel Accord in 1988 did not actually refer to common equity, but required a minimum of 2% in common equity, a total of 4% in common equity and certain hybrids with indefinite maturities (“Tier 1 capital”), and a total of 8% in common equity and certain hybrids with either indefinite or very long maturities (“Tier 2 capital”).

In the recent financial crisis, the holders of hybrid securities (and, of course, also senior creditors) of many banks were bailed out and paid in full without suffering any losses.⁸³ In many cases, even shareholders were spared from full liability for losses. In reaction to this experience, the new Basel Accord (“Basel III”) has tightened capital requirements so that banks now have to use common equity equal to 7% of their (risk-weighted) assets, up from the previous 2%. Moreover, many hybrids are no longer recognized as regulatory capital.

At the same time, there has been growing enthusiasm for new forms of hybrid securities, called contingent convertible securities also known as contingent capital or “co-cos. These are debt securities that convert to something else if a triggering event occurs, e.g., if the bank’s share price reaches a specified conversion level, or if the supervisors call for conversion. Conversion might be into shares, at a predetermined price; conversion might also involve a complete writedown.⁸⁴

Proposals for regulatory requirements involving such securities have been made by Flannery (2005), French et al., (2010), and Calomiris and Herring (2012)). Such proposals have been taken up by Switzerland and by the UK’s Independent Commission on Banking.⁸⁵ Related

⁸² So-called “silent participations”, which are popular on the European continent and have been much used in connection with government bailouts in the crisis, have a similar position between debt and equity.

⁸³ See Basel Committee on Banking Supervision (2009)

⁸⁴ Debt securities that are converted into shares when the trigger is pulled have been issued by Credit Suisse, debt securities that are written down have been issued by UBS.

⁸⁵ The European Union’s Liikanen Commission has made a similar proposal, which however refers to mandatory conversions or writedowns in resolution. The point of this proposal is to require such securities to be held outside the banking sector so that there are no (?) systemic repercussions to be feared from the conversion imposing losses on investors. By having special “bail-innable securities”, presumably the need for bailout funding in resolution is reduced.

proposals for contingent mandatory write downs or conversion of debt to equity have also been termed “bail-in” and there have been other variations proposed. Some of them try to avoid getting to the point of insolvency by triggering conversion or capitalization at an earlier point.⁸⁶

These proposals are usually justified on the grounds that such securities are better than debt because they provide for additional loss absorption, automatic recapitalization or expedited resolution if the bank is in difficulties. The question is why this capacity should not be coming in the form of equity. What, if anything, is gained by having complicated debt-like securities instead of equity?

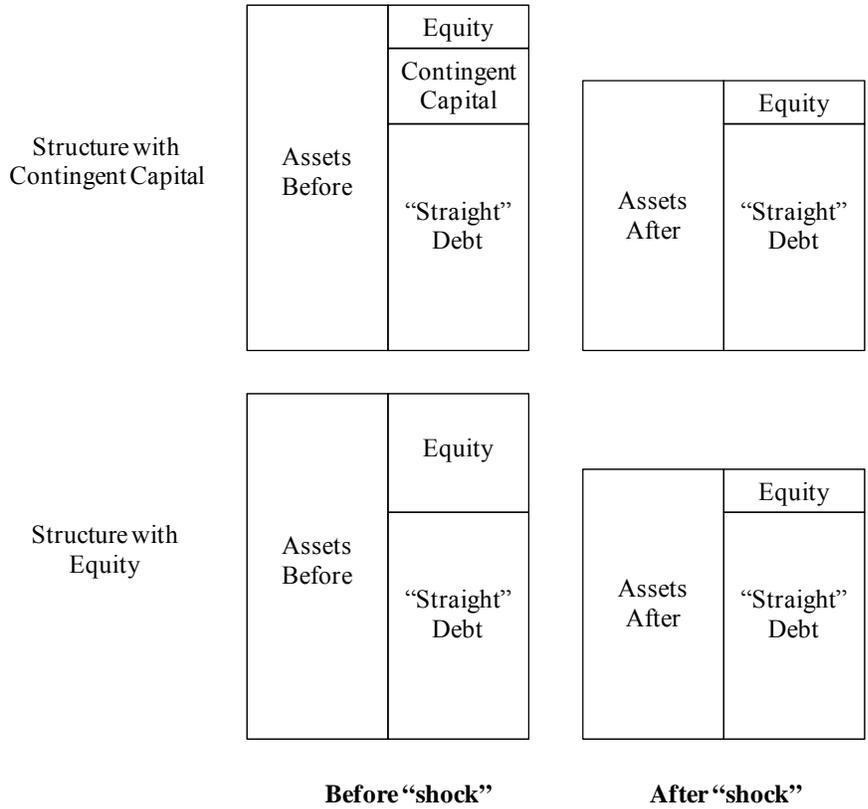
Typical answers to this question point to the resistance of the industry against higher equity requirements, to the difficulties of raising additional equity, and to the costs of doing so. These concerns involve arguments that we have dealt with in Sections 3-6. In determining regulations concerning the proper funding mix *ex ante* perspective should be taken, with a view to how the choice between straight debt, hybrid securities and equity would affect the banks’ funding costs, governance, lending, etc. For any such assessment, our analysis above is relevant. Specifically, except for the wedge between decision makers’ private costs and social costs, and in the absence of other frictions, a funding mix that relies on equity for loss absorption is *not* more “expensive” than one that allows for hybrid securities to provide some loss absorption.

To see this point, consider Figure 5, which compares cushions involving the use of contingent capital to those using only equity. The top panel illustrates how contingent capital is meant to provide a cushion in the event of a loss and to the conversion of the contingent capital to equity. The balance sheet before the shock that caused the trigger (the top left hand side) is transformed into the balance sheet on the top right hand side. The bottom panel traces the same development under the alternative assumption that instead of contingent capital, additional equity was used to provide the additional cushion. The outcome is of course the same. With equity, however, there is no need to go through the process of mandatory conversion, and the potentially problematic process and any uncertainties leading up to the actual conversion are avoided.⁸⁷

⁸⁶ On the bail-in concept see, for example, “From Bail-Out to Bail-In,” *The Economist*, January 30, 2010, and BIS (2010b). Unfortunately, the term bail-in has been used in several senses. Traditionally it referred to the practice of making creditors, including senior unsecured creditors, share in the losses from the debtor’s insolvency. In this sense, the European Commission has used the term in its 2012 proposal for a European Banking Recovery and Resolution Directive. Whereas this traditional meaning refers to *all* uninsured creditors, the notion of “bail-innable” securities, e.g., in the Liikanen Report, refers to some specialized securities and their holders. The multiplicity of meanings may give rise to the notion that all other securities should not be subject to “bail-ins” in bank resolution, i.e. that the replacement of bankruptcy procedures by special bank recovery and resolution procedures should provide for an automatic bailout of creditors other than those holding “bail-innable” securities. Such a practice would amount to a vast expansion of explicit government guarantees, with all the adverse consequences discussed in Section 4.2. In particular, it would contribute to making equity even more “expensive” for the banks thought not for society. French et al. (2010) discuss, contingent capital in a chapter that is distinct from the discussion of capital regulation (and in fact these two chapters are separated by a chapter on compensation).

⁸⁷ In this figure we are implicitly assuming that the “straight debt” is safe or insured, so its value does not change from “before” to “after.” If the bank had some straight debt that is not insured, then its value might decline in this transition, because the lower asset value might expose it to an actual default risk. This does not change the conclusion that the structure with equity leads to the same results as the one with contingent capital.

Figure 5: Comparing Contingent Capital to Equity



One of the main motivations for having “debt-like” hybrid securities appears to be the preservation of the tax subsidy associated with debt financing. Interestingly, in the U.S. the Collins Amendment eliminated the use of hybrids called Trust Preferred Securities in capital regulation, and the push to allow for contingent capital instead of equity has been weaker than in Europe. In the U.S. tax code, debt-like hybrid securities would not be classified as deserving the tax treatment of debt because their holders do not have full “creditor rights.” Where the tax advantage is obtained, the arguments given in Section 4.1 imply that the private benefits received by banks are matched by costs to the taxpayer and therefore cannot be treated as social benefits.

In sum, our analysis shows that there is no sense in which hybrid securities are “cheaper” than equity from society’s perspective. If the investors who hold the hybrid securities anticipate conversion, similar to creditors envisioning default or bankruptcy, they would require high rates of interest on these securities as compensation for the risk to which they are exposed. This conclusion follows from the same basic insights discussed in Section 3.3. Equity can be thought of as contingent capital that is converted *ab initio*.

There are in fact significant ways in which hybrid securities are dominated by equity both in terms of the ability to provide reliable loss absorption and the ability to remove distortions due to conflicts of interest among security holders. The details of how the triggers and conversion rules

for hybrids are specified can leave much room for manipulation. In particular, at times when the relevant indicators are close to the triggers for conversion, managers or strategic investors can take actions that might precipitate conversion; there might also be runs in the markets for these securities or for the shares of the banks.⁸⁸ Whereas the existence of such securities reduces financial instability associated with default and bankruptcy, it can introduce a new kind of instability associated with conversion events.

Relative to earlier forms of hybrid securities and subordinated debt securities, proposals for contingent capital intend to make conversion automatic. However, if the holders of these securities are sufficiently important, government temptation to bail them out will be no less than it was for subordinated and hybrid securities in the current crisis. Moreover, while the conversion itself may be automatic, when the bank is in difficulties, holders of these securities may want to sell them before the conditions for conversion arise. The attempt to smooth matters in a later stage may just pull some of the frictions forward in time.

In addition, the priority that such securities have over equity gives rise to debt overhang effects such as underinvestment, which can distort lending and investment decisions. Since no valid case has been made that these securities alleviate any inherent frictions, relying on them for regulation does not appear to be justifiable.⁸⁹ The skepticism that we expressed in Section 5 concerning the potential role of debt in resolving governance problems or any other frictions extends hybrid securities. As for liquidity provision by banks' "producing" debt, the concern, expressed in Sections 8 that with little equity, debt may be at a risk of default and therefore neither informationally insensitive nor very liquid, applies to hybrid securities near the triggers for conversion. The liquidity of the hybrid securities themselves requires, if anything, even more equity than the liquidity of bank debt.

The case for including hybrid securities as part of capital regulation has not been established against simpler approaches based on equity. Instead, regulators should maintain banks' equity levels at a safe range and intervene promptly if they decline, banning payouts to shareholders and mandating equity issuance.⁹⁰

⁸⁸ An early analysis of the valuation of contingent capital claims and the impact of including such a security in the capital structure of banks, see Raviv (2004). Issues related to how triggers should be set and the potential for a "death spiral" if the conversion decision can be manipulated through short-term trading are discussed in Duffie (2010), Sundaresan and Wang (2013), and McDonald (2010).

⁸⁹ A similar conclusion is reached in Goodhart (2010), and it applies as well to variations of contingent capital such as COERCs ("Call Option Enhanced Reverse Convertibles"), proposed by Pennacchi, et al. (2010), which give shareholders the option to repay the debt to avoid dilutive conversion, and ERNs ("equity recourse notes"), proposed by Bulow and Klemperer (2013), bonds that pay in shares instead of cash under some conditions..

⁹⁰ For a discussion of how to make equity requirements work, see Admati and Hellwig (2013a, Chapter 11, especially pp. 188-191).

9. Equity Requirements and Bank Lending

“Bankers warned higher capital requirements would inhibit economic growth.”
The Wall Street Journal, August 30, 2010.

“[D]ouble-digit [capital] ratios will undermine lending.” (“We must rethink Basel or growth will Suffer,” Vikram Pandit, Citi CEO, *Financial Times*, November 10, 2010)

Statement: “Increased equity requirements would have adverse effects on bank lending and would inhibit economic growth.”

Assessment: This statement is false. High leverage distorts lending decisions and can therefore be harmful to economic growth. Better capitalized banks tend to make *better* lending decisions.

For many, the most serious concern about increased capital requirements is the fear that banks might cut back on their lending or charge more on the loans they make. Based on the discussion in Sections 3-5 we can offer a detailed analysis of this issue.

Before assessing the claims that increased equity requirements would lead to a credit crunch, we should remember that the biggest “credit crunch” in recent memory, the total freezing of credit markets during the recent financial crisis, was not due to too much equity but in fact was due to too *little* equity and to the extremely high levels of leverage in the financial system. In other words, credit crunches arise when banks are *undercapitalized*. If all banks have sufficient equity capital, they will have no reason to pass up economically valuable lending opportunities, and the risk of future credit crunches is reduced. It is quite clear that lending was disrupted in 2007-2008 due to banks having too little equity to withstand the losses stemming from housing price declines. Kapan and Minoiu (2013), shows that banks with strong balance sheets were better able to maintain lending during the crisis, and suggest that “strong bank balance sheets are key for the recovery of credit following crises.” (See also Buch and Prieto, 2012.)

Assertions that increased equity requirements would harm lending are often based on the fallacies we discussed in Section 3. Equity is confused with cash so higher equity requirements are falsely taken to mean that the bank must have higher cash holdings and fewer loans or securities purchases (see Section 3.1). Or equity is taken as given, so higher equity requirements are falsely taken to mean that the bank must have fewer assets, as in balance sheet A in Figure 1. As we pointed out in Section 3.2, reducing loans and investments, as in balance sheet A in Figure 1 is by no means the only possible reaction a bank might have to higher equity requirements. The bank could also recapitalize by issuing equity and using the proceeds to buy back debt (balance sheet B in Figure 1) or can issue new equity and use the proceeds to buy marketable securities are even to make new loans (balance sheet C in Figure 1).

Some fear that increasing equity requirements will cause banks to charge more on the loans that they make.⁹¹ As discussed in Sections 3.3 and 3.4, some of the arguments underlying such fears are fallacious, based on incomplete assessments of the effects of a bank’s funding mix on its funding costs, neglecting the fact that, if a bank funds with more equity, the risk per dollar

⁹¹ See, for example, Elliott (2013), Barclays Credit Research, “The Costs of a Safer Financial System,” March 25, 2013, Clearing House, “Vanquishing TBTF,” March 26, 2013, Oxford Economics, “Analyzing the impact of bank capital and liquidity regulations on US economic growth (A report prepared for The Clearing House), April 2013.

invested in equity (or debt) goes down. As discussed in Section 4, increases in equity requirements will remove some of the subsidies banks capture through high leverage, namely tax shields and implicit guarantees. However, if taking away these subsidies causes banks to lend less or to charge higher rates than is considered desirable, it may be desirable from a public-policy perspective to subsidize bank lending. If lending needs to be subsidized because it is important for the economy, then more targeted and much less costly ways must be found to provide such subsidies than encouraging banks to be highly leveraged.

As we have argued in Sections 4.3 and 4.4, as well as Admati et al. (2013), the banks' owners and their managers may not want to raise new equity, but that is different from saying that they cannot do so or that it would be socially inefficient to do so. The basic reason for their resistance is that, when a bank is distressed, increases in equity create benefits for creditors or credit insurers that come at the expense of incumbent shareholders. If forced to raise the ratio of their equity to their investments, then, as we discuss in Admati et al. (2013), managers and shareholders will have private incentives to do so by contracting their balance sheets rather than raising new funds. Regulators can counteract these private incentives by mandating specific amounts of new equity that must be raised, e.g. an amount equal to the target percentage of assets held at a specific point in the past. The private incentives of banks' shareholders reflect only distributive concerns rather than social efficiencies and should not stand in the way of interventions that are socially beneficial.⁹²

Some banking institutions may find it difficult to raise new equity because they have no access or only limited access to equity markets and their owners have limited funds. Examples would be community banks, co-operative banks and credit unions, or government-owned banks. With such banks, a capital shortfall may temporarily reduce their lending but, if they are profitable, they can build new equity from retentions. Here again, any negative impact of increased equity requirements on lending that might arise could be neutralized by regulators taking an active role in the transition, restricting payouts to shareholders and mandating specific amounts of new equity that must be achieved through retained profits and, possibly, new share issuance.

If a publicly-traded bank is actually *unable* to raise significant additional equity by issuing new shares, it is quite likely that the bank is insolvent, or close to being insolvent, and the authorities should either force the bank to recognize its losses, restructure its debt and clean up its balance sheet or wind the bank down. In this case, it is not the equity requirements that are causing the problem – it is the bank's distress or possible insolvency. Concerns about the effect of equity requirements on lending are most acute when banks are distressed because of a negative shock. In this case, regulators may refrain from intervening and cleaning up because they are afraid of the impact of their intervention on the macroeconomy. Forcing banks to recognize losses and clean up their balance sheets, so they fear, would make the banks cut their lending even more and deepen the economic downturn.

Such forbearance is, however, misguided. The empirical record shows that, if a fear of a credit crunch causes the authorities to delay the resolution of banking problems, the problems

⁹²Hanson et al. (2010) discuss the importance of debt overhang in potentially leading to lending contraction when banks are under-capitalized and make similar recommendations that banks are given specific amounts as targets for new equity.

will become worse and, when the reckoning comes, the credit crunch, the macroeconomic downturn and the costs to the government are likely to be much larger.⁹³ Paradigmatic examples are Sweden and Japan in the early 1990s. When the crisis broke in 1992, the Swedish authorities immediately intervened, recognized losses, and cleaned up the banking system; there was a sharp recession and soon afterwards a strong upturn. By contrast, the Japanese authorities allowed their banks to avoid recognizing losses and to continue operating even though many of them were distressed or even insolvent. This failure to intervene quickly is considered a major cause of the ongoing malaise of the Japanese economy. One cost of inaction of the sort seen in Japan is that weak banks that are allowed to remain weak often prefer to provide additional funds to their old customers, even when the customers themselves are insolvent, rather than to lend to new, and perhaps more innovative, entrepreneurs. By exhibiting forbearance and even providing new loans to zombie borrowers, these banks prevent these customers from actually defaulting, which would force the banks to acknowledge losses on these loans in their books.⁹⁴

Similar considerations apply if banks are unprofitable and are likely to remain so because there is excess capacity in banking and competition is squeezing the banks' margins. In this situation, the banks may in fact be unable to raise new equity either by going to the market or by retaining earnings. In such a situation some downsizing of the industry is likely to be called for. With excess capacity in the industry, lending may be excessive and loans may be too cheap relative to their social costs. Moreover, banks may have excessive incentives to gamble merely in order to survive.⁹⁵

In this context, we should remember that the breakdown of 2007-2008 was preceded by a period when banks provided many loans that afterwards turned sour, e.g., loans for real estate in the United States, Ireland, the United Kingdom and Spain and loans to the Greek government. Not all lending is beneficial. One important function of banks is to distinguish between worthy and unworthy borrowers, and there is such a thing as excessive lending, which causes resources to be wasted and ends up being a drag on welfare and growth. In the years before the crisis, banks did not properly fulfill this function, and many resources were wasted. Lack of appropriate liability, misguided pursuance of ROE, and distorted incentives from regulation were prominent among the causes of this waste.

Warnings that higher equity requirements would restrict lending and harm economic growth seem to presume that more lending is always better, for economic growth and for welfare. This

⁹³ See Advisory Scientific Committee of the European Systemic Risk Board (2012) and the references given there.

⁹⁴ Hoshi and Kashyap (2004, 2010). Similar behavior seems to have occurred in the wake of the financial crisis of 2007-2009. According to Bank of International Settlements (BIS, 2012), observed reductions in US banks' loan exposures were probably due to these banks' refraining from new lending rather than acknowledging losses on old loans.

⁹⁵ There are no good direct measures of excess capacity, but excess capacity in any given market can be inferred if there are artificial barriers to market exit and margin competition is so intense that participants can survive only if they take risks that impose burdens on others. An example is provided by covered-bond finance in Europe following the liberalization of entry by a legal change in Germany in 2005. With government-guaranteed Landesbanken expanding greatly, competition got so intense that participants could only survive by using maturity transformation for the unsecured funding needed to finance the legally mandated excess of the collateral over the value of the covered bonds. Thus, Belgian-French Dexia and German Hype Real Estate, which did not have a deposit base and used wholesale short-term borrowing instead, got into trouble when wholesale markets broke down in September 2008.

presumption is absurd. To see this, consider the following response to our arguments: “Admittedly, if banks can raise new equity, as indicated by balance sheet C in Figure 1, the effects of the higher equity requirement on lending can be neutralized. However, if the equity requirements were kept low and the banks issued new equity as indicated by balance sheet C, they could expand their lending even more! Relative to such a larger expansion, it is still the case that higher equity requirements inhibit lending and growth.” The argument only makes sense if the demand for loans is unbounded. And so it may well be – for loans that have little chance of being repaid. However, savers who want to see a return on their savings would feel defrauded if too many such loans were made. At conditions that make it worthwhile for savers to put up the money rather than use the money for their own consumption, the demand for loans is bounded.

In this context, it is worth noting that, for many banks, particularly the large ones, loans represent only a small part of their assets. For example, in June 2013 JP Morgan Chase had only \$700 billion in loans out of assets that exceeded \$2 trillion. Indeed, its loans were actually less than the \$1.2 trillion it had in deposits, suggesting it has plenty of “capacity” for increased lending simply by substituting from other asset holdings. Clearly, from their perspective, demand for worthy loans are anything but unbounded.

The important question then is what incentives the banks have to properly discriminate worthy loans and other investments from wasteful ones. On this question, much of our discussion in previous sections suggests that banks will make better lending decisions if they are better capitalized. Equity holders in a leveraged bank, and managers working on their behalf or compensated on the basis of ROE or other equity based measures, have incentives to make excessively risky investments, and this problem is exacerbated when the debt has government guarantees.⁹⁶ With more equity, these distortions would be much reduced.

Some distortions may also be due to the mode of regulation. The system of “risk-weighting” that is used to determine equity requirements allows banks to borrow more if the assets they invest in are deemed to be “less risky”. To determine how risky an asset is, banks can rely on their own risk models and their own ratings of loan customers. The scope for “risk weight management”, i.e. management of models with a view to “economizing on equity” is larger for tradable securities than for loans. This situation creates a regulation-induced bias in favor of securities and against lending. This bias has contributed to the bubble in U.S. mortgage securitization before the crisis, directing funds into real-estate loans that could be easily securitized, rather than business loans that were less easy to securitize.⁹⁷

Better loss absorption from more equity would also improve efficiency in lending. If banks are better able to absorb losses, negative shocks will be less destructive, and banks will be in a better position to continue lending after such shocks. By contrast, if thinly capitalized banks are hit by negative shocks, even if they are not downright insolvent, they may be so vulnerable that they may feel compelled to cut back on lending even if this requires them to forego some

⁹⁶ It has been argued that a significant number of the loans that were made prior to the 2007-2009 financial crisis, such as some sub-prime mortgage loans, were ones that should not have been made and could not be justified by conventional lending standards.

⁹⁷ The other major sources of waste in the runup to the crisis, lending to sovereigns debtors, as well as real-estate and interbank lending in Europe, also benefited from an excessively favorable regulatory treatment of risks and risk weights. For sovereigns borrowing in the currency of their own country, risk weights were (and continue to be) zero; for real-estate and interbank loans, risk weights for credit risk also benefited from special treatment.

profitable loans. The credit crunch in the fall of 2008 was in large part due to banks' entering the crisis with too little equity and then being at the mercy of the news about losses that came in. By contrast, if the banks had used more equity funding before the financial crisis, they would have been in a much better position to deal with the crisis and would not have had to cut back so much on their lending and other investments.

To be sure, our arguments suggest that, in such a crunch, if they are not insolvent, they should be able to raise their equity again by issuing new shares. However, as we explained in Sections 4.3 and 4.4, the effects of debt overhang will make them resist such a move. Shareholders and managers may prefer to gamble for the bank's prospects to improve even without new equity. As explained by Myers (1977), this effect of debt overhang may even cause them to pass up some profitable lending opportunities.

Negative fallout from thinly capitalized banks' being hit by negative shocks is not limited to cases where the shocks cause the banks to become insolvent. Even if the banks are "only" in distress and are struggling to satisfy regulatory requirements, how much equity they have can make a huge difference to the financial system. Compare the bank's situation with 3% equity and with 20% equity. If the bank's equity amounts to 3% of its balance sheet and there is a 1% decline in the value of its assets, the bank must sell almost 33% of its assets if it wishes to restore the 3% ratio of equity relative to assets. If this happens with several banks at the same time, the effects on asset markets can be enormous, causing asset prices to decline sharply and requiring all institutions that hold such assets to record further losses. By contrast, if the bank's initial equity equals 20% of its balance sheet, the same 1% fall in asset value requires only a little more than 4% of assets to be sold to restore the 20% ratio. The repercussions on asset markets and asset prices are then much smaller.

More generally, if banks are better capitalized, their greater ability to absorb losses is likely to reduce contagion effects so that the financial system is more robust. Lending and other financial activities are likely to be less volatile and less procyclical. In contrast to the view that higher equity requirements always restrict lending, if banks rely on retained earnings to meet equity requirements, one should expect higher equity requirements to *reduce lending in a boom and to increase lending in a crisis*. Whereas banks' books tend to show profits in boom times and losses in crises, the extent to which these fluctuations induce fluctuations in lending capacity depends on required equity ratios. With an equity ratio of 2% an additional dollar in profits or losses translates into an addition or diminution of lending capacity by fifty dollars; with an equity ratio of 20%, the change in lending capacity would only amount to five dollars. If one believes decisions in boom times are marked by irrational exuberance and decisions in crisis times by excessive pessimism, such smoothing of lending decisions may contribute to improving loan performance. More importantly, smoothing of the supply of credit can benefit the rest of the economy: Potential borrowers may have better assurance that bank loans are available if their prospects are good, thereby reducing the cyclicity of investment decisions and the systemic repercussions from the financial sector to the rest of the economy.

The lesson is clear: allowing banks to be thinly capitalized leads with unacceptably high probability to situations where debt overhang and shareholder resistance to reducing leverage creates problems that require regulators to intervene and force banks to raise equity and lower leverage against their will. (In the worst cases, thinly capitalized banks become insolvent and must be unwound). By requiring thinly capitalized banks to build up significant equity through earnings retention and equity issuance, regulators create many long run benefits associated with

the much reduced likelihood of insolvency and debt overhang problems in the future. Anyone worried about short term costs, which as we have argued are more illusory than real, must factor in how these would be offset by the longer term gains.

To summarize, under appropriately designed and significantly higher equity capital requirements, banks would be more likely to make better, more *economically appropriate*, lending decisions, thereby reducing the social losses that stem from too little or too much lending. If banks can quickly become better capitalized (by adding equity without suffering negative consequences, as discussed in Section 3.2), there should be no concern with any negative impact on the economy of increased equity capital requirements. If banks are unprofitable and therefore unable to raise equity through either retentions or new share issues, some consolidation of the industry may be called for even if that implies less lending; in this case, less lending is likely to mean less wasteful lending.

10. Concluding Remarks and Policy Recommendations

We have shown that arguments asserting that increased equity requirements for banks entail significant social costs are flawed. Why do we hear these arguments? One possible answer is given in the table on the last page. Both bank shareholders and bank managers have some strong incentives to maintain high leverage and to resist increased equity capital requirements.⁹⁸ Government subsidies that reward debt and penalize equity financing benefit managers and some shareholders. These subsidies would be reduced if equity capital requirements were increased. Of course, arguments made by bankers against increased capital requirements are not automatically invalid just because it might be in their interest to oppose this stricter regulation. However, policymakers should be especially skeptical when evaluating claims that are not supported by strong arguments when those who make the claims have a personal interest in making the claims. As we have shown, the arguments that have been made in this policy debate are based on fallacies, irrelevant facts, or inadequate theories or “myths.”

Political economy of fallacious arguments

The debate over capital regulation is reminiscent of the battle some years ago in the U.S. over expensing stock options. The issue in that debate concerned inconsistencies in the treatment of employee compensation on the income statement. Whereas compensation in cash and restricted stock was recognized as an immediate expense for the calculation of earnings, employee compensation given through stock options was not recognized as an expense as long as the options were not “in the money” when they were issued. When the Financial Accounting Standards Board (FASB) attempted to change this accounting treatment in 1994 by requiring that

⁹⁸ The shareholders who have concentrated holdings in banks will generally have the narrow incentives we identify in the table. However, most shareholders are diversified shareholders who in addition to holding bank stocks have other holdings and interests that are harmed when banks are fragile. These shareholders are also taxpayers who can be harmed by fragile banks. Once we consider all of the interests of diversified shareholders who happen to own some bank stocks, it is clear that their interests are not necessarily aligned with the narrow interests of shareholders with concentrated bank holdings.

options be expensed in a way that reflected their true cost to the firm, a fierce political battle ensued.

Opponents of option expensing made three types of arguments. The first was that a company incurs no cost in granting executive stock options when they are issued, since the options are not in the money. Of course, this statement is simply fallacious. The second statement that was often made was that executive options are difficult to value with precision. But while this statement is true, because the value of these options depends, for example, on the difficult to model exercise decisions of employees, it is basically irrelevant. Just because the options are difficult to value does not mean that valuing them at *zero* is appropriate.⁹⁹ The third argument made against expensing options asserted that expensing options would have a *real and negative* impact on the economy, by somehow preventing entrepreneurial firms from obtaining financing, which would impede growth and reduce the competitiveness of the U.S. economy. These assertions were ultimately based on some form of investor irrationality, since they implied that investors would be misled by changes in accounting rules even though these changes had no effect on the underlying economics of the firm.

All of the above arguments were made at various times, but of course it was the claims about the “real” effects of expensing options that were most effective with politicians. In fact, in 1994 the U.S. Congress threatened to dismantle FASB unless it backed off from the plan to expense options. A decade later, after WorldCom, Enron, and other corporate scandals, it suddenly became politically palatable to expense options, and FASB went ahead to change the rules with minimal objections from Congress. And what was the result? There has been no evidence that this change in accounting rules had any negative economic impact whatsoever.

Quite similarly, as we have discussed, the arguments against high equity capital requirements fall under the same three categories: those that are fallacious, those that are true but irrelevant, and those that are unpersuasive. Because the social benefits of significantly reducing bank leverage are significant, and because there are no significant social costs of significantly increasing equity requirements for banks, threats that increasing equity requirements would be harmful should not be taken seriously. High equity requirements need not interfere with any of the valuable intermediation activities undertaken by banks, and transitions to higher requirements can be managed relatively quickly

How high should equity requirements be?

Given the above assessment, what is the appropriate equity capital requirement? Various empirical studies, e.g., BIS (2010a), Bank of Canada (2010), and IIF (2010), have attempted to answer this question using a variety of models to estimate the costs and benefits of increased equity requirements. Discussing and assessing the various empirical models that are used in these documents is beyond our scope here. However, it appears that the methods of analysis used in most of these studies fall prey to many of the concerns we have identified in this paper. For example, in BIS (2010a) the analysis uses a *fixed* estimate for the cost of equity that is based on historical averages, ignoring the fact that decreased leverage would necessarily lower the risk premium on equity. Moreover, the approach in most of these studies assumes that if bank margins or ROE decline, or bank taxes increase, these effects translate to social costs, which is

⁹⁹ In fact, companies often value complex liabilities, such as health care costs of retirees, in preparing accounting statements.

incorrect. Calculations of the benefits of increased equity requirements in these analyses also do not take into account potential improvements in the quality of lending decisions that better capitalized banks are likely to make. While some of these might be hard to measure, we suspect that upon closer examination the net social benefits of increased equity requirements have been under-estimated in these studies. This under-estimation might be quite substantial, which is very problematic given that the social costs are significantly over-estimated.¹⁰⁰

To attempt to give even a rough, order-of-magnitude answer to the question of what appropriate equity requirements *should* be, one must take into account the complex ways that capital ratios are calculated, something that we have not addressed in this paper. Requirements mostly refer to accounting values, or book values of assets and liabilities, which depend on accounting conventions and often lag behind market developments. Moreover, they mostly refer to so-called “risk-weighted assets”, rather than the total assets of a bank. Many important institutions have “core capital” equal to 10% or more of risk-weighted assets under Basel rules, but this often is no more than 1% to 3% of total, un-weighted assets on their balance sheets. The use of risk-weighted assets for capital regulation is based on the idea that the riskiness of the assets should in principle guide regulators on how much of an equity cushion they should require. In the recent financial crisis, however, assets that had zero risk weights in the banks’ models could suddenly experience severe problems and even lead to bank failures and bailouts.¹⁰¹ Any system of capital regulation must come to terms with these issues.

Leaving aside the issue of how one accounts for the riskiness of banks’ assets, and taking as a benchmark current levels of risk, one can discuss capital requirements in terms of unweighted equity ratios, i.e., equity capital relative to total assets (off-balance sheet as well as on-balance sheet) held by the bank. Historical comparisons (e.g., evidence provided in Alessandri and Haldane (2009)) suggest that equity capital ratios as high as 20% or 30% on an unweighted basis should not be unthinkable. Another benchmark can be gleaned by considering Real Estate Investment Trusts (REITs), which do not enjoy tax benefits from leverage nor are they candidates for bailouts in the event of default. According to Ooi, Ong and Li (2008), REITs typically maintain equity capital in excess of 30% of assets. Such levels are considered minimal for corporations outside banking without regulation, and there is no reason banks cannot or should not rely much more on equity to fund their investments. As we argued, just because banks have become so highly leverage does not prove that these levels are socially efficient, only that banks had incentives and ability to get to these levels, partly as a result of the expansion in their “safety nets.”

¹⁰⁰Kashyap, Stein and Hanson (2010), who also point out fallacies associated with not adjusting required returns to the reduced riskiness of equity that results from higher equity requirements, focus on the legitimate concerns related to regulatory arbitrage and shadow banking, which we mention below. However, in their estimate of the impact of increased equity requirements on lending costs, they still take the tax code as given, neglecting the fact that such transfers are not themselves a social cost. As discussed in Section 5.2, we also take issue with their recommendation that regulators give banks significant time to adjust to higher equity requirements due to information asymmetries and the “stigma” associated with equity issuance. Instead, we recommend payout restrictions and possibly mandatory equity issuance that in fact alleviate these problems and accelerate the capitalization process.

¹⁰¹ Given this experience, Hellwig (2010) had suggested that the notion of measuring risks is itself quite an illusion and that in practice the risk-calibration approach provides banks with too much scope for manipulating their models so as to “economize” on equity capital by not recognizing risks. This proposal has been developed further in Admati and Hellwig (2013a). See also Haldane (2012).

Given appropriate systems for tracking the systemic risks of important financial institutions, regulators can use their judgment to adjust the equity requirements of all banks according to economic conditions such as market values of different securities, possibly using tools such as payout restrictions and mandatory equity issuance, in a manner analogous to the use of margin requirements by financial exchanges to maintain the safety of transactions.¹⁰²

Transitioning to higher equity capital requirements

How would banks get to the point of having much larger equity cushions? Should they be given many years to build up their equity capital? It is widely argued, and recent policy proposals recommend, that banks be given a very long time to adjust to new capital requirements. Kashyap, Stein and Hanson (2010) based their recommendation on the claim that, as suggested in Myers and Majluf (1984), equity issuance might be costly if investors fear that managers issue equity only when it is overpriced, which may make banks reluctant to issue new equity to satisfy capital requirements. This problem can be alleviated if regulators actually remove some of the discretion that banks might otherwise have with respect to equity issuance. By setting schedules for banks so that they must issue equity at specific times, investors will no longer be justified in making negative inferences about any particular bank based on the fact that it is issuing equity. In this context, it is particularly important that, during the transition, requirements be formulated in terms of amounts of equity that must be raised rather than ratios of total, or risk-weighted assets. If requirements are formulated in terms of ratios, debt overhang effects may give banks an incentive to fulfill the requirements by deleveraging, i.e. selling assets and reducing debt, in particular junior debt, rather than raising their equity.¹⁰³

Our discussion produces another clear-cut policy recommendation, which provides an efficient way to increase equity cushions. Whatever is the target equity ratio, regulators should make sure to *prohibit banks, for a period of time, from making any payouts to shareholders*. The eagerness of banks to make these payouts is in fact evidence of the conflict of interest between shareholders on one hand and debtholders or taxpayers on the other, because the funds paid out to shareholders are no longer available to pay creditors. For example, the largest 19 U.S. banks paid out \$131 billion to their shareholders between 2006 and 2008, and these funds were not available to make loans or pay creditors as the financial crisis escalated.¹⁰⁴ The U.S. government invested about \$160 billion in these banks starting fall 2008 and in 2009 within the TARP

¹⁰² Hart and Zingales (2010) propose that regulators use market information to determine when to force banks to recapitalize. As mentioned in Duffie (2010), regulators might be able to force banks to increase equity capital through mandatory rights offerings. See Admati and Hellwig (2013, Chapter 11) for a discussion of how to make equity requirements work.

¹⁰³ See Admati et al. (2013) for a detailed analysis of how debt overhang effects affect a bank's preference over the different modes of adjusting to higher equity requirements that are represented by balance sheets A, B, and C in Figure 1. The suggestion that, in transition, higher equity requirements should be formulated in terms of amounts rather than ratios has also been made by Hanson et al. (2011). For a discussion of this issue in the context of the European recapitalization exercise of 2011-2012, see Chapter 11 in Admati and Hellwig (2013a).

¹⁰⁴ Banyl, Porter and Williams (2010) document an increase in stock repurchases by U.S. financial institutions prior to 2007, including specifically those who later received TARP funds. According to Acharya, Gujral, and Shin (2009), large U.S. banks paid \$130 billion in dividends during 2007-2008, years in which they were in distress and where most were also being provided with additional funding from the government. Rosengren (2010) also points out that regulators should ban equity payouts in a crisis situation. Acharya, et al. (2011), Acharya, Mehran and Thakor (2010) and Goodhart et al. (2010), suggest that regulators use restrictions on dividends as part of prudential capital regulation.

program, effectively replenishing the funds in the form of preferred shares and subordinated debt. If done under the force of regulation, withholding dividends would not lead to any negative inference on the health of any particular bank.¹⁰⁵

Moreover, banks can be directed by regulators to raise more equity from private investors, possibly their own shareholders in a rights offering. As we discussed, inability to raise equity is a strong indication that a bank might be insolvent or not viable without subsidies, and such banks should be unwound. Another possibility is to make payouts to executives in the form of new equity shares. Based on the idea of a “conservation buffer” in Basel III and that of “prompt corrective action” (see discussed in Admati and Hellwig, 2013a, Chapter 11), allowing equity to absorb losses and building it up through payout restrictions and possibly new equity issuance is a way for regulators to make equity requirements work.

*Equity requirements and “regulatory arbitrage”
through the shadow banking system*

Bankers and others frequently use arguments against higher capital requirements that do not directly address the merits of such requirements, but are based instead on issues concerning the enforceability of higher requirements. Specifically, warnings are frequently made that financial activities will move out of the regulated part of the financial system and into the unregulated part, the so-called shadow banking system. Given that institutions in the shadow banking system may have hardly any equity at all, such a development would increase the overall fragility of the financial system.

Clearly, attempts to get around regulations were important in the buildup of risk that led to the financial crisis. For example, financial institutions from Continental Europe used conduits and structured-investment vehicles located in Ireland or in New Jersey, i.e., shadow banking institutions in other jurisdictions, in order to invest in mortgage-backed securities and related derivatives on a large scale and with a highly leveraged structure. The breakdown of these shadow-banking institutions in the summer of 2007 played a major role in amplifying and transmitting problems in the U.S. real-estate and mortgage sectors and turning them into a global financial crisis.

However, these issues only demonstrate that enforcement has been ineffective and this has been harmful. The expansion of operations in the shadow banking system that contributed so disastrously to the crisis could easily have been avoided if regulators had used the powers that they had at their disposal. With practically no equity of their own, the shadow banking institutions involved in the recent crisis would have been unable to obtain any finance at all if it had not been for commitments made by sponsoring banks in the regulated system. These banks’ guarantees enabled the unregulated shadow banks to obtain funds by issuing asset-backed commercial paper. If regulators had wanted to, they could have intervened and prevented this on the grounds that the shadow banks were not really independent and this should have been recognized by putting them on their sponsoring banks’ balance sheets. Alternatively, if the

¹⁰⁵ Note that banks’ stock prices will likely fall as a result of implementing such policies because current prices reflect the value of government subsidies as well as shareholders’ ability, absent such dividend prohibition, to generate cash payout on a regular basis without too much concern about the solvency of the bank. Forcing banks to retain earnings and to build up their equity capital reduces the value of these subsidies (a benefit to taxpayers), and in addition would provide significant social benefits.

shadow banks were deemed to be independent, then the regulators should have ruled that the guarantees were in conflict with regulations limiting large exposures to individual parties. The fact that regulators saw fit not to interfere raises questions about the political economy of financial regulation in the past decade, but not about the ability of regulation in principle to prevent or limit regulatory arbitrage.

In the context of this discussion an indiscriminate reference to “the shadow banking system” is unhelpful. Institutions outside the regulated sector that operate *without* sponsors from the regulated part of the financial system tend to have significantly less leverage than regulated banks. In the crisis, many independent hedge funds had problems and quite a number of them went under, but the systemic fallout from their failures was minimal. The parts of the shadow banking system that did significantly contribute to the crisis were directly related to banks in the regulated system – and to the failure of regulators to properly deal with the institutions and activities in their domains.¹⁰⁶

Given the experience that we have gone through, it is clear that a better control of the system must be the goal. The fact that “regulatory arbitrage” was more successful than it should have been must not lead us to conclude that we should avoid regulation. With such a conclusion, we would accept that we are helpless to prevent another crisis. Instead, we need to tighten both the regulations that we have *and* the defenses against regulatory arbitrage.

An ever-present and important challenge in capital regulation is therefore determining on an ongoing basis the appropriate set of institutions or, better, activities that should be regulated. Other challenges, such as those related to the cyclical dynamics implied by rigid equity requirements and to how capital should be measured (e.g., what should be based on accounting and what should be marked to market) must also be considered carefully. In any case, regulators must be able to assess the *true* leverage of regulated entities, as well as their contribution to systemic risk, and prevent tricks from being used to hide leverage and risk exposures. All of this should be taken as a challenge for improvement, not as a reason to avoid beneficial capital regulation that is focused on reducing excessive leverage.

Misplaced concerns about international competitiveness

Another set of arguments often made in this debate that are not related to the merits of high equity requirements concern competitive issues perceived to arise when requirements are not fully harmonized across countries. Bankers warn that higher equity capital requirements in one country will induce that country’s financial institutions to “lose out” in global financial competition against the institutions of other countries that have lower equity capital requirements.

As explained in Admati and Hellwig (2013a, Chapter 12), this so-called “level playing field” argument, while popular and politically effective, is very problematic. First, there are many financial products and many financial markets, and there is competition in each one of them. Any talk about failure and success in global financial competition is meaningless unless one is clear about the markets that one is referring to. For example, some banks do very well in serving

¹⁰⁶ Of course, it is also possible for hedge funds to become highly leveraged and pose systemic risk, and thus regulators should also monitor their leverage and risk, and some regulation that would prevent such systemic risk from developing might be desirable. At the very least it seems desirable to have

certain retail markets, for loans and deposits, where they have hardly any competitor from abroad. Some markets with a truly global scope, such as major stock exchanges or certain derivatives markets, are dominated by just a few major institutions, which moreover tend to be located in an even smaller number of jurisdictions.

Second, the implicit identification of national interests with the competitive successes of the country's financial institutions is unwarranted. For Irish taxpayers it would have been much better if Irish financial institutions had been less successful in the markets for funds and in the markets for providing loans for Irish real estate developments. For German taxpayers it would have been much better if the shadow banks of the German Landesbanken had been less successful in acquiring asset-backed securities and issuing asset-backed commercial paper. For Swiss taxpayers it would have been much better if UBS Investment Bank had been less successful in acquiring a significant share of the market for re-securitizing low-grade subprime mortgage-backed securities.

In all these examples, the erstwhile competitive successes of financial institutions ended up imposing huge burdens on taxpayers. Competitive successes that are supported by public subsidies generally lower a country's welfare. Firms in the subsidized sector – and the managers of these firms – benefit, but the resources that these firms command by virtue of the subsidies most often could be put to better uses elsewhere. From theory and policy analysis in the area of international trade, it is well known that, if the “competitiveness” of a sector in international markets is due to government subsidies, the costs of this “competitiveness” to the taxpayer usually exceed the benefits to the firms that receive them. This assessment is just as valid for international trade involving financial services and capital movements as for trade in goods and other kinds of services. Wouldn't the economies of the United States and Germany be better off if, over the past decade, more of the newly available funds had been invested in lending to small businesses rather than in lending to subprime-mortgage borrowers? Wouldn't our economies be better off if some of the highly educated and talented people who have gone into banking over the past two decades had instead gone into other productive and innovative activities?¹⁰⁷

The answers to the above questions are not clear. The idea of having a market economy is to let firms compete for funds and other resources on the basis of the economic value they can add. The market itself helps the economy find out how to best use its scarce resources. For this process to work well, however, it must not be distorted by unwarranted public subsidies. Given the role that subsidies from bail-outs and implicit guarantees paid for by taxpayers have played and continue to play in the financial sector, there is a *prima facie* presumption that our societies may be devoting excessive resources to institutions in this sector and to the “competitive successes” of these institutions. Higher equity capital requirements would reduce the need for such subsidies and reduce the associated distortions caused by subsidies. If this means that

¹⁰⁷ Underlying the argument here is the classic theory of international trade. As was first observed by Ricardo, an economy cannot be internationally successful in competition in all sectors at the same time. Because international exchange, like any other exchange, is based on the notion of a *quid pro quo*, the country whose firms are successful in the market for the “*quid*” is necessarily unsuccessful in the market for the “*quo*.” To be sure, these markets are served by different firms, but these firms are connected by their reliance on domestic input markets. The firm that has a comparative advantage in international trade uses its advantage to bid input prices up; this hurts the competitiveness of the other firm. In this context, the question whether physicists are better employed in banks or in engineering is directly relevant.

financial institutions lose out on certain kinds of competition through the loss of unwarranted public subsidies, such “failures” may be very much in the national interest.

Final remarks

Banking institutions clearly serve an important function in the economy by providing credit and creating liquid deposits. High leverage is *not* required for them to be able to perform these socially valuable functions. To the contrary, high leverage makes banking institutions highly *inefficient* and exposes the public to unnecessary risk and harm. When the possibility of harm from the distress and insolvency of banks becomes so large that governments and central banks must step in to prevent it, additional distortions arise. Current policies end up subsidizing and encouraging banks to choose levels of leverage and risk that are excessive. Countering these forces with effective equity requirements is highly beneficial.

Threats that substantial increases in equity requirements will have significant negative effects on the economy and growth should not be taken seriously, because in fact it is weak, poorly capitalized banks and a fragile system that harm the economy. Transitioning to a healthier and more stable system is possible and highly beneficial and would improve the ability of the financial sector to serve a useful role in the broader economy.

We have based our analysis on an assessment of the fundamental economic issues involved. Any discussion of this important topic in public policy should be fully focused on the *social* costs and benefits of different policies, i.e., the costs and benefits *for society*, and not just on the private costs and benefit of some institutions or people. Moreover, assertions should be based on sound arguments and persuasive evidence. Unfortunately, the level of policy debate on this subject has not been consistent with these standards.

Table 2: Summary of Reasons and Critiques

“Reasons” given for why increased equity capital requirements would be costly	Is the statement true?	Would this “reason” give incentives to bank managers to object to increased capital requirements?	Would this “reason” give incentives to bank shareholders to object to increased capital requirements?	<u>From a public policy perspective</u> , is this a legitimate reason for not significantly increasing capital requirements?
Increased equity requirements would prevent banks from operating at the optimal scale.	No. Equity can be added to the balance sheet without changing the bank’s core business.	It should not, because it is false.	It should not, because it is false.	No! It is false.
Increased equity requirements reduce the average ROE (Return on Equity) for banks.	Generally Yes.	Yes if compensation depends on ROE.	It should not, because risk is reduced and the value of equity would not change.	No! This is irrelevant to value creation.
Increased equity requirements would increase banks’ total funding costs, because banks would be forced to use more equity, which has a higher required rate of return.	No. Changing the capital structure changes how risk is distributed but not the overall cost of funding.	It should not, because it is false.	It should not, because it is false.	No! It is false.
Increased equity requirements would decrease the size of the interest tax shields banks can obtain through debt financing.	Yes.	Perhaps, but this depends on their compensation and preferences.	Yes, because shareholders benefit from subsidies.	No! Tax shields create incentives for excessive leverage, resulting in negative externalities. Reducing subsidies creates a social benefit not a social cost.
Increased equity requirements reduce banks’ ability to use cheap debt financing that is subsidized by implicit government guarantees.	Yes.	Yes if compensation is related to equity value.	Yes, because shareholders benefit from subsidies.	No! Guarantees encourage the use of debt, but leverage generates negative externalities and distortions.
Increased equity requirements would reduce managerial discipline and thus interfere with effective governance.	Very unlikely to be true.	No.	It should not, because there are alternative ways to create effective governance.	No! Claims that debt disciplines managers are not supported by adequate theories or by empirical evidence.
Equity is costly because managers may have better information than investors.	Possibly true for new equity issuance but not for other forms of leverage reduction.	Perhaps.	Perhaps.	No! Frictions due to information asymmetries can be alleviated by issuing equity through rights offerings and through giving banks less discretion about earnings retention and equity issuance.

References

- 1) Acharya, Viral V., Irvind Gujral, Nirupama Kulkarni and Hyun Song Shin (2011), “Dividends and Bank Capital in the Financial Crisis of 2007-2009,” Working paper.
- 2) Acharya, Viral V., Hamid Mehran, and Anjan Thakor (2010) “Caught between Scylla and Charybdis? Regulating Bank Leverage when there is Rent Seeking and Risk Shifting,” Working paper.
- 3) Acharya, Viral, V. and Matthew Richardson (2009), “How Securitization Concentrated Risk in the Financial Sector,” *Critical Review*, Special Issue on the Financial Crisis.
- 4) Acharya, Viral V., Philipp Schnabl, and Gustavo Suarez (2013) “Securitization without Risk Transfer,” *Journal of Financial economics*, 107(3), 515-536.
- 5) Acharya, Viral V. and Sascha Steffen (2013), “The “Greatest” Carry Trade Ever: Understanding Eurozone Bank Risk,” Working paper
- 6) Ackermann, Josef (2010), “The New Architecture of Financial Regulation: Will it Prevent Another Crisis?” Working paper.
- 7) Admati, Anat R., Peter Conti-Brown and Paul Pfleiderer (2012), “Liability Holding Companies,” *UCLA Law Review* 852: 852–913.
- 8) Admati, Anat R., Peter DeMarzo, Martin Hellwig and Paul Pfleiderer (2013), “The Leverage Ratchet Effect,” Working Paper.
- 9) Admati, Anat R. and Martin F. Hellwig (2013a), *The Bankers’ New Clothes: What’s Wrong with Banking and What to Do about It*, Princeton University Press.
- 10) Admati, Anat R. and Martin F. Hellwig (2013b), “Does Debt Discipline Managers? An Academic Myth about Bank Indebtedness,” Working paper.
- 11) Admati, Anat R. and Martin F. Hellwig (2013c), “The Parade of Bankers new Clothes Continues: 23 Flawed Claims Debunked,” Working paper.
- 12) Adrian, Tobias and Hyun Song Shin (2010), “Liquidity and Leverage,” *Journal of Financial Intermediation*, 19, 418-437.
- 13) Adrian, Tobias and Markus K. Brunnermeier (2009), “CoVaR.” Federal Reserve Bank of New York Staff Report 348.
- 14) Advisory Scientific Committee of the European Systemic Risk Board, Forbearance, resolution, and deposit insurance, Report No. 1, July 2012
- 15) Akerlof, George A. (1970), “The Market for “Lemons”: Quality Uncertainty and the Market Mechanism,” *Quarterly Journal of Economics*, 488-500.
- 16) Akerlof, George A. and Paul M. Romer, (1993), “Looting: The Economic Underworld of Bankruptcy for Profit,” *Brookings Papers on Economic Activity*. 1-73.
- 17) Alessandri, Piergiorgio and Andrew G. Haldane, (2009), “Banking on the State,” Presented at the Federal Reserve Bank of Chicago 12th Annual International Banking Conference, September 25, 2009.

- 18) Ang, Andrew, Sergey Gorovyy and Gregory B. van Inwegen (2011), "Hedge Fund Leverage," NBER working paper 16801.
- 19) Angeletos, George-Marios, and Iván Werning (2006), "Crises and Prices: Information Aggregation, Multiplicity, and Volatility," *American Economic Review* 96, 1720-1736.
- 20) Angelini, Paolo et al. (2011), "Basel III: Long Term Impact on Economic Performance and Fluctuation," Federal Reserve Bank of New York, Staff Report 485.
- 21) Baker, Malcolm P. and Jeffrey Wurgler (2013), "Do Strict Capital Requirements Raise the Cost of Capital? Banking Regulation and the Low Risk Anomaly," NBER Working paper.
- 22) Bank of Canada (2010), "Strengthening International Capital and Liquidity Standards: A Macroeconomic Impact Assessment for Canada."
- 23) Bank for International Settlements (BIS) (2012), 82nd Annual Report 1 April 2011–31 March 2012, Basel 2012.
- 24) Banyi, Monica, Susan Porter, and Susan Williams (2010), "Stock Repurchases and TARP in the Banking Industry," Working paper.
- 25) Basel Committee on Banking Supervision (BIS, 2009), "Strengthening the Resilience of the Banking Sector."
- 26) Basel Committee on Banking Supervision (BIS, 2010a), "An Assessment of the Long-Term Economic Impact of Stronger Capital and Liquidity Requirements."
- 27) Basel Committee on Banking Supervision (BIS, 2010b), "Proposal to ensure the loss absorbency of regulatory capital at the point of non-viability - consultative document."
- 28) Bebchuk, Lucian A., Alma Cohen, and Holger Spamann (2010), "The Wages of Failure: Executive Compensation at Bear Stearns and Lehman 2000-2008," *Yale Journal of Regulation*, 27, 257-282.
- 29) Bebchuk, Lucian A. and Holger Spamann (2010), "Regulating Bankers' pay," *Georgetown Law Journal*, 247-287,"
- 30) Berger, Allen N., Richard J. Herring, and Giorgio P. Szegö (1995), "The Role of Capital in Financial Institution," *Journal of Banking and Finance*, 19, 393-430.
- 31) Berger, Allen N., and Christa H.S. Bouwman (2010), "Bank Capital, Survival, and Performance around Financial Crises," working paper.
- 32) Bhagat, Sanjai and Brian Bolton (2010), "Bank Executive Compensation and Capital Requirements Reform," Working paper.
- 33) Bolton, Patrick and Xavier Freixas (2006), "Corporate Finance and the Monetary Transmission Mechanism," *Review of Financial Studies*, 19, 829-870.
- 34) Bolton, Patrick, Hamid Mehran and Joel Shapiro (2010), "Executive Compensation and Risk Taking," working paper.
- 35) Bolton, Patrick, Tano Santos and Jose Scheinkman (2010), "Outside and Inside Liquidity," *Quarterly Journal of Economics*, forthcoming.

- 36) Boot, Arnoud W.A. (1996), "Comments on "Market Structure, Monitoring and Capital Adequacy Regulation" by Thomas Gehrig", *Swiss Journal of Economics and Statistics*, 132, 703-706
- 37) Boot, Arnoud W.A. and Anjolein Schmeits (1998), "Challenges to competitive banking: a theoretical perspective," *Research in Economics* (1998) 52, 255–270.
- 38) Boskin, Michael J. (2010), "Time to Junk the Corporate Tax," *The Wall Street Journal*, May 6, 2010.
- 39) Brealey, Richard A. (2006), "Basel II: The Route Ahead or Col-de-sac?," *Journal of Applied Corporate Finance*, 4, 34-43.
- 40) Brunnermeier, Markus and Martin Ohemke, (2010), "The Maturity Rat Race," Working paper.
- 41) Buch, Claudia M., and Esteban Prieto (2012). "Do Better Capitalized Banks Lend Less? Long-Run Panel Evidence from Germany," Working Paper.
- 42) Calomiris, Charles W. (1999), "Building an Incentive Compatible Safety Net," *Journal of Banking & Finance*, 23, 1499-1519.
- 43) Calomiris, Charles W. and Gary Gorton (1991), "The Origins of Banking Panics," in: G. Hubbard (ed.), *Financial Markets and Financial Crises*, University of Chicago Press, Chicago, 109-173
- 44) Calomiris, Charles W., and Richard J. Herring (2011), "Why and How to Design a Contingent Convertible Debt Requirement." Working paper.
- 45) Calomiris, Charles W. and Charles M. Kahn (1991), "The Role of Demandable Debt in Structuring Optimal Banking Arrangements," *American Economic Review*, 81, 497-513.
- 46) Chari, Varadarajan V., and Ravi Jagannathan (1988), "Banking Panics, Information, and Rational Expectations Equilibrium," *Journal of Finance* 43, 749-760.
- 47) Carbo-Valverde, Santiago, Edward J. Kane, and Francisco Rodriguez-Frenandez (2011), "Safety-Net Benefit Conferred on Difficult-to-Fail-and-Unwind Banks in the US and EU Before and During the Great Recession," Working paper.
- 48) Cole, Rebel A., (2012), "How Did the Financial Crisis Affect Small Business Lending in the U.S.?" Working paper.
- 49) Dang, Tri Vi, Gary Gorton, and Bengt Holmström (2012), "Ignorance, Debt and Financial Crises," Working Paper.
- 50) Davies, Richard, and Belinda Tracey (2012), "Too Big to Be Efficient? The Impact of Implicit Funding Subsidies on Scale Economies in Banking." Working paper.
- 51) DeAngelo, Harry and René Stulz, "Why High Leverage is Optimal for Banks," Working Paper 2013
- 52) Dewatripont, Mathias, and Jean Tirole (1994a), "A Theory of Debt and Equity: Diversity of Securities and Manager-Share-holder Congruence," *Quarterly Journal of Economics*, 109, 1027-1054.

- 53) Dewatripont, Mathias, and Jean Tirole (1994b), *The Prudential Regulation of Banks*. MIT Press.
- 54) Dewatripont, Mathias, and Jean Tirole (2012), "Macroeconomic Shocks and Banking Regulation," *Journal of Money, Credit and Banking*, 237-254.
- 55) Diamond, Douglas W., (1984) "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies* 51, 393-414.
- 56) Diamond, Douglas W., and Phillip H. Dybvig (1983), "Bank Runs, Deposit Insurance, and Liquidity," *Journal of Political Economy* 91, 401-419.
- 57) Diamond, Douglas W., and Raghuram G. Rajan (2000), "A Theory of Bank Capital," *Journal of Finance*, 55, 2431-2465.
- 58) Diamond, Douglas W., and Raghuram G. Rajan (2001), "Liquidity Risk, Liquidity Creation and Financial Fragility," *Journal of Political Economy* 109, 287-327.
- 59) Diamond, Douglas W., and Raghuram G. Rajan (2012), "Illiquid Banks, Financial Stability, and Interest Rate Policy," *Journal of Political Economy* 120, 552-591.
- 60) DeMarzo, Peter M. (1988), "An Extension of the Modigliani-Miller Theorem to Stochastic Economies with Incomplete Markets and Interdependent Securities," *Journal of Economic Theory*, 353-369.
- 61) DeMarzo, Peter M. and Darrell Duffie (1999), "A Liquidity-Based Model of Security Design," *Econometrica*, 65-99.
- 62) DeMarzo, Peter M, Ilan Kremer and Andrzej Skrzypacz (2005), "Bidding with Securities: Auctions and Security Design," *American Economic Review*, 936-959.
- 63) Dewatripont, Mathias, and Jean Tirole (1994a), *The Prudential Regulation of Banks*. MIT Press.
- 64) Dewatripont, Mathias, and Jean Tirole (1994b), "A Theory of Debt and Equity: Diversity of Securities and Manager-Shareholder Congruence." *The Quarterly Journal of Economics*, 109(4), 1027-54.
- 65) Dewatripont, Mathias, and Jean Tirole (2013), "Macroeconomic Shocks and Banking Regulation," *Journal of Money, Credit, and Banking*, Forthcoming.
- 66) Duffie, Darrell (2010), "*How Big Banks Fail and What to Do About It*," Princeton University Press, forthcoming.
- 67) Elliott, Douglas J. (2009), "Bank Capital and the Stress Tests," Working paper.
- 68) Elliott, Douglas J. (2013), "Higher Bank Capital Requirements Would Come at a Price," Working paper.
- 69) Flannery, Mark J. (2005), "No Pain, No Gain? Effecting Market Discipline via Reverse Convertible Debentures," Chapter 5 of Hall S. Scott, ed. *Capital Adequacy Beyond Basel: Banking Securities and Insurance*, Oxford: Oxford University Press.
- 70) French, Kenneth, Martin N. Baily, John Y. Campbell, John H. Cochrane, Douglas W. Diamond, Darrell Duffie, Anil K. Kashyap, Frederic S. Mishkin, Raghuram G. Rajan,

- David S. Scharfstein, Robert J. Shiller, Hyun Song Shin, Matthew J. Slaughter, Jeremy C. Stein, and René M. Stulz (2010), *The Squam Lake Report: Fixing the Financial System*. Princeton, NJ: Princeton University Press.
- 71) Gale, Douglas M. and Martin F. Hellwig (1985), “Incentive-Compatible Debt Contracts: The One-Period Problem,” *Review of Economic Studies* 52, 647-663.
 - 72) Gandhi, Priyank, and Hanno Lustig (2010), “Size Anomalies in U.S. Bank Stock Returns: A Fiscal Explanation,” Working paper.
 - 73) Geanakoplos, John (2010), “Solving the Present Crisis and Managing the Leverage Cycle,” FRBNY *Economics Policy Review*, 101-131.
 - 74) Goldstein, Itay, and Ady Pauzner (2005), “Demand-Deposit Contracts and the Probability of Bank Runs,” *Journal of Finance* 60, 1293-1327.
 - 75) Goodhart, Charles (2010a), “How Should We Regulate the Financial Sector?” Chapter 5 of *The Future of Finance*, LSE.
 - 76) Goodhart, Charles, M. U. Peiris, D.P. Tsomocos, and A. P. Vardoulakis (2010), “On Dividend Restrictions and the Collapse of the Interbank Market,” *Annals of Finance*, February.
 - 77) Gorton, Gary B. (2010), *Slapped by the Invisible Hand: The Panic of 2007*, Oxford University Press.
 - 78) Gorton, Gary B. (2012), *Misunderstanding Crises: Why We Don’t See them Coming*. Oxford University Press.
 - 79) Gorton, Gary B. and Andrew Metrick (2009), “Securitized banking and the run on repo,” NBER Working Paper No. 15223.
 - 80) Gorton, Gary B. and George Pennacchi (1990), “Financial Intermediation and Liquidity Creating,” *Journal of Finance*, 49-71.
 - 81) Haldane, Andrew, G. (2010), “Regulation or Prohibition: The \$100 billion Question,” *Journal of Regulation and Risk North Asia*, 101-122.
 - 82) Haldane, Andrew G. (2012), “The Dog and the Frisbee,” Speech given in Jackson Hole conference, August 31.
 - 83) Haldane, Andrew, Simon Brennan and Vasileios Madouros (2010), “What is the Contribution of the Financial Sector: Miracle or Mirage?” Chapter 2 of *The Future of Finance*, LSE.
 - 84) Han, JoongHo, Kwangwoo Park and George Pennacchi (2013), “Corporate Taxes and Securitization,” *Journal of Finance*, Forthcoming
 - 85) Hanson, Samuel, Anil K. Kashyap, and Jeremy C. Stein (2010), “A Macroprudential Approach to Financial Regulation,” *Journal of Economic Perspectives*, Forthcoming.
 - 86) Harrison, Ian (2004), “Banks, Capital and Regulation: Towards an Optimal Capital Regime for a Small Open Economy,” Working paper, Reserve Bank of New Zealand.

- 87) Hart, Oliver and Luigi Zingales (2010), "A New Capital Regulation for Large Financial Institutions," Working paper.
- 88) Hellwig, Martin F., (1981), "Bankruptcy, Limited Liability, and the Modigliani-Miller Theorem," *American Economic Review*, 155-170.
- 89) Hellwig, Christian (2002), "Public Information, Private Information, and the Multiplicity of Equilibria in Coordination Games," *Journal of Economic Theory* 107, 191-222
- 90) Hellwig, Martin F. (2009a), "A Reconsideration of the Jensen-Meckling Model of Outside Finance," *Journal of Financial Intermediation* 18, 495-525.
- 91) Hellwig, Martin F. (2009b), "Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis," *De Economist*, 157, pp. 129-207
- 92) Hellwig, Martin F. (2010), "Capital Regulation: Business as Usual?" Working paper.
- 93) Hellwig, Martin F. (2013), "Liquidity Provision and Equity Funding of Banks," Working paper.
- 94) Holmström, Bengt, and Jean Tirole (1993), "Market Liquidity and Performance Monitoring," *Journal of Political Economy* 101, 678-709.
- 95) Holtfrerich, Carl-Ludwig (1981): "Die Eigenkapitalausstattung deutscher Kreditinstitute 1871-1945," *Bankhistorisches Archiv, Beiheft* 5, 15-29.
- 96) Hoshi, Takeo and Anil Kashyap (2004), "Japan's Financial Crisis and Economic Stagnation", *Journal of Economic Perspectives* 18, Winter 2004, 3–26.
- 97) Hoshi, Takeo and Anil Kashyap (2010), "Why did Japan stop growing?," NBER working paper, 2010.
- 98) Institute of International Finance (IIF, 2010) "Interim Report on the Cumulative Impact on the Global Economy of Proposed Changes in the Banking Regulatory Framework."
- 99) Jacklin, Charles J., and Sudipto Bhattacharya (1988), "Distinguishing Panics and Information-Based Bank Runs: Welfare and Policy Implications," *Journal of Political Economy* 96, 568-592.
- 100) Jensen, Michael C. (1986), "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review, Papers and Proceedings* 76, 323-329.
- 101) Jensen, Michael C. (1989), "Eclipse of the Public Corporation," *Harvard Business Review*, September-October 1989, 61-74.
- 102) Jensen, Michael C. (1993), "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems," *Journal of Finance* 48, 831-880.
- 103) Jensen, Michael C. and William H. Meckling (1976), "Theory of the Firm: Managerial Behavior, Agency Costs and Capital Structure," *Journal of Financial Economics* 3, 305-360.
- 104) Johnson, Simon and James Kwak (2010), "*13 Bankers*," Pantheon, NY.

- 105) Kane, Edward J. (1989), *“The S & L Insurance Mass, How Did It Happen?”* Urban Institute Press, Washington.
- 106) Kane, Edward J. (2010), “Missing Elements in US Financial Reform: The Grievous Inadequacy of the Dodd-Frank Act,” Working paper.
- 107) Kapan, Tümer and Camelia Minoiu (2013), “Balance Sheet Strength and Bank Lending During the Global Financial Crisis,” IMF working paper.
- 108) Kashyap, Anil K., Raghuram G. Rajan, and Jeremy C. Stein (2008), “Rethinking Capital Regulation,” September 2008, Federal Reserve Bank of Kansas City Symposium.
- 109) Kashyap, Anil K., Jeremy C. Stein, and Samuel Hanson (2010), “An Analysis of the Impact of “Substantially Heightened” Capital Requirements on Large Financial Institutions,” Working Paper.
- 110) Kelly, Brian, Hanno Lustig, and Stijn Van Nieuwerburgh (2012) “Too-Systemic-to-Fail: What Option Markets Imply about Sector-Wide Government Guarantees,” Working paper.
- 111) King, Mervyn (1990), “International Harmonisation of the Regulation of Capital Markets: An Introduction,” *European Economic Review*, 34, 569-577.
- 112) Kotlikoff, Laurence J. (2010), *“Jimmy Stuart is Dead: Ending the World’s Financial Plague Before it Strikes Again,”* John Wiley & Sons, Inc.
- 113) Krishnamurthy, Arvind, Stefan Nagel and Dmitri Orlov (2011), “Sizing up Repo,” Working paper.
- 114) Malysheva, Nadezhda and John R. Walter (2010), “How Large Has the Federal Financial Safety Net Become?” Federal Reserve of Richmond Working Paper.
- 115) Mankiw, Gregory N., Matthew C. Weinzierl, and Danny Yagan (2009), “Optimal Taxation in Theory and Practice,” Harvard Business School Working paper.
- 116) McDonald, Robert L. (2010), “Contingent Capital with a Dual Price Trigger,” Working paper.
- 117) Mehran, Hamid and Anjan Thakor (2010, “Bank Capital and Value in the Cross Section,” *Review of Financial Studies*, forthcoming.
- 118) Miles, David, Jing Yang and Gilberto Marcheggiano (2011), “Optimal Bank Capital,” Bank of England Discussion Paper.
- 119) Miller, Merton H. (1995), “Does the M&M Proposition Apply to Banks?” *Journal of Banking and Finance*, 19, 483-489.
- 120) Mishkin, Frederic S. (2013), *The Economics of Money and Financial Markets, Business School Edition*, Third Edition, Pearson.
- 121) Modigliani, Franco and Merton H. Miller, (1958), “The Cost of Capital, Corporation Finance, and the Theory of Investment” *American Economic Review*, 48, 261-297.
- 122) Morris, Stephen, and Hyun Song Shin (1998), “Unique Equilibrium in a Model of Self-Fulfilling Currency Attacks,” *American Economic Review* 88, 587-597.

- 123) Myers, Stewart C. (1977), "Determinants of Corporate Borrowing," *Journal of Financial Economics* 5, 147-175.
- 124) Myers, Stewart C. and Nicholas S. Majluf (1984), "Corporate Finance and Investment Decisions When Firms Have Information that Investors Do Not Have," *Journal of Financial Economics* 13, 187-222.
- 125) Myers, Stewart C. and Raghuram G. Rajan (1998), "The Paradox of Liquidity," *Quarterly Journal of Economics* 113, 733-771.
- 126) Ooi, Joseph T. L., Seow-Eng Ong, and Lin Li (2008), "An Analysis of the Financing Decisions of REITs: The Role of Market Timing and Target Leverage," *Journal of Real Estate Finance and Economics*, 40, 130-160.
- 127) Pfleiderer, Paul (2010), "On the Relevancy of Modigliani and Miller to Banking: A Parable and Some Observations, working paper.
- 128) Poole, William, (2009), "Moral Hazard: The Long-Lasting Legacy of Bailouts," *Financial Analysts Journal*, Nov/Dec, 1-7.
- 129) Poole, William, (2010), "Ending Moral Hazard," *Financial Analysts Journal*, Nov/Dec, 17-24
- 130) Pozsar, Zoltan, Tobias Adrian, Adam B. Ashcraft, and Haley Boeskey (2010), "Shadow Banking," Federal Reserve Bank of New York Staff Report 458.
- 131) Raviv, Alon (2004), "Bank Stability and Market Discipline: Debt for Equity Swap versus Subordinated Notes," Working paper.
- 132) Rochet, J-C., and Xavier Vives (2004), "Coordination Failure and the Lender of the Last Resort: Was Bagehot Right After All?" *Journal of the European Economic Association* 2, 1116-1147.
- 133) Rosengren, Eric S. (2010), "Dividend Policy and Capital Retention: A Systemic 'First Response'," Speech given at "Rethinking Central Banking" Conference, Washington, D.C., October 10, 2010.
- 134) Schaefer, Stephen M. (1990), "The Regulation of Bank and Securities Firms," *European Economic Review*, 34, 587-597.
- 135) Schnabel, Isabel (2004), "The German Twin Crisis of 1931," *Journal of Economic History*, 64, 822-871.
- 136) Schnabel, Isabel (2009), "The Role of Liquidity and Implicit Guarantees in the German Twin Crisis of 1931," *Journal of International Money and Finance*, 28, 1-25.
- 137) Stein, Jeremy C. (2010), "Monetary policy as financial-stability regulation," Working Paper, Harvard University.
- 138) Stiglitz, Joseph E. (1969), "A Re-Examination of the Modigliani-Miller Theorem," *American Economic Review* 784-793.
- 139) Stiglitz, Joseph E. (1974), "The Irrelevance of Corporate Financial Policy," *American Economic Review* 851-866.

- 140) Stiglitz, J. E. and A. W. Weiss (1981), "Credit Rationing in Markets with Imperfect Information," *American Economic Review* 71, 393-410.
- 141) Sundaresan, Suresh and Zhenyu Wang (2010), "Design of Contingent Capital with Stock Price Trigger for Conversion," Working paper.
- 142) Townsend, Robert M. (1979), "Optimal Contracts and Competitive Markets with Costly State Verification," *Journal of Economic Theory* 21, 265-293.
- 143) Tsatsaronis, Kostas and Jing Yang (2012), "Bank stock returns, leverage and the Business Cycle," BIS Quarterly Review, March, 45-59.
- 144) Turner, Adair (2010), "What do Banks do? Why do Credit Booms and Busts Occur and What can Public Policy Do about it?" Chapter 1 of *The Future of Finance*, LSE.
- 145) Van den Heuvel (2008), "The welfare cost of bank capital requirements," *Journal of Monetary Economics* 55 298–320.
- 146) Walter, John R. and John A. Weinberg (2002), "How Large Is the Federal Financial Safety Net?" *The Cato Journal*, 369-393.
- 147) White, Lawrence J. (1991), "*The S&L Debacle: Public Policy Lessons for Bank and Thrift Regulation*," Oxford University Press, New York.