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**Bank Leverage, Welfare,
and Regulation**

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Abstract

We take issue with claims that the funding mix of banks, which makes them fragile and crisis-prone, is efficient because it reflects special liquidity benefits of bank debt. Even aside from neglecting the systemic damage to the economy that banks' distress and default cause, such claims are invalid because banks have multiple small creditors and are unable to commit effectively to their overall funding mix and investment strategy *ex ante*. The resulting market outcomes under *laissez-faire* are inefficient and involve excessive borrowing, with default risks that jeopardize the purported liquidity benefits. Contrary to claims in the literature that "equity is expensive" and that regulation requiring more equity in the funding mix entails costs to society, such regulation actually helps create useful commitment for banks to avoid the inefficiently high borrowing that comes under *laissez-faire*. Effective regulation is beneficial even without considering systemic risk; if such regulation also reduces systemic risk, the benefits are even larger.

Keywords: Liquidity in banking, leverage in banking, banking regulation, capital structure, capital regulations, agency costs, commitment, contracting, maturity rat race, leverage ratchet effect, Basel.

JEL Classification: D004, D53, D61, G01, G18, G21, G24, G28, G32, G38, H81, K23

Bank Leverage, Welfare, and Regulation

Anat R. Admati and Martin F. Hellwig*

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1. Introduction

Banks tend to rely much more heavily on debt for their funding, i.e., to have significantly more financial leverage than other firms. Moreover, much of their debt involves short-term loans or deposits that must be paid on demand. This funding mix makes banks fragile. If there is a lot of debt, even small losses can cause insolvency. Moreover, if much of the debt is short-term, there is a significant risk creditors will become concerned about potential default and the bank will lose funding. These two problems are linked, because concerns about insolvency are a major reason creditors might lose trust and withdraw their funds.

The financial system has also become increasingly complex in recent decades with the advent of derivatives, securitization, and globalization. Financial institutions are much more interconnected, and systemic risks have increased. Through various contagion mechanisms, distress or insolvency are likely to affect many institutions at the same time, and even a single default can create a cascade of distress and affect the entire economy.

In the aftermath of the financial crisis of 2007-2009, bank regulators moved to reform the rules meant to restrain banks' leverage and the extent of the mismatch between the maturities of their assets and their liabilities. "Basel III," the international accord on banking regulation signed in 2010, imposed new rules concerning the maturity structure of banks' liabilities in relation to their assets.

Basel III still allows banks to fund 97 percent of their assets with debt. Yet, the banking industry lobbies strongly to reduce equity requirements even today. The mantras often used are "equity is expensive" and "credit and growth will suffer", suggesting that safety in banking comes at a cost and that society would have to sacrifice some of the benefits of the banking system if regulations require more equity in the funding mix.

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Many of the arguments and warnings made by industry lobbies and others in this discussion are flawed. In particular, those who oppose equity regulation often refer to the private costs of the regulation to banks and their loan customers without considering the benefits of the regulation to the banks' creditors, taxpayers, and the rest of the economy.

Some researchers have suggested that banks' choosing extremely fragile funding mixes is efficient. For example, bank debt is said to provide its holders with special benefits because it is liquid and can be used for payments at any time. Given these benefits, the more debt the bank issues, the better the outcomes are said to be.¹

However, the conclusion that high leverage of banks is desirable depends critically on very special and unrealistic assumptions in the makeup of the models that are used to support the argument. If these assumptions are modified to make them more realistic, the conclusions are overturned. In fact, the banks' choices that we observe are much better explained by the incentives they have to act in ways that harm others and by their inability to commit to behavior that avoids the harm.

When managers and shareholders take actions that benefit themselves, the costs and risks are often borne by creditors or taxpayers. Managers might be motivated to use debt and avoid equity because compensation structures reward risk and leverage or because tax subsidies and explicit or implicit government guarantees make debt more attractive than equity funding.² If excessive borrowing cannot be prevented by commitments to existing lenders or by regulation the outcome can be very inefficient, a far cry from the standard view that *laissez-faire* yields efficient outcomes.

The conclusion that the funding mix under *laissez-faire* in banking involves excessive borrowing holds even if we consider only the interests of the banks' investors (shareholders and creditors) and if we ignore the risks and potential harm to the rest of the financial system and the overall economy. Effective regulation that limits bank leverage is beneficial because it counters incentive distortions and effectively commits banks to avoiding excessive borrowing. If in addition the regulation reduces systemic risk, the benefits are even larger.

Full commitment would require that explicit or implicit contracts specify decisions and actions, including actions concerning additional funding, for every possible future situation. Moreover, the covenants detailing these decisions and actions must be enforceable. Enforceability in turn presumes that the decisions and actions and the situations in which they are to be taken can be observed by

¹ See, in particular, Gorton (2010), Gorton and Winton (2016), DeAngelo and Stulz (2015).

² Bank managers and executives are often compensated on the basis of Return on Equity (ROE). As we explain in Admati and Hellwig (2013a, Chapter 8), such compensation structure encourages excessive risk taking and borrowing. Tax subsidies and explicit and implicit guarantees and subsidies also encourage, enable and reward borrowing and discourage the use of equity. See Admati et al. (2013a, Section 2, 2018), Admati and Hellwig (2013a, Chapter 9) and Admati (2014).

creditors and, in the case of recourse to the legal system, verified by the courts. These presumptions may hold if covenants are simple and specific enough, but then they may be too rigid to allow the borrowers to respond efficiently to changes in the economic environment.³ More complex covenants that allow for flexible responses to changes in the environment may be difficult and costly to enforce either because creditors must devote significant resources to monitoring and controlling the borrower's ongoing behavior or because the courts are not able to verify whether the conditions for which the contracts stipulates a certain behavior are actually met. When there are many creditors, any one of them may not have any strong incentives to invest in monitoring, and even if he or she does, the scope for this creditor to influence the borrower's behavior may be small.

The problem of how to assure creditors that their trust will not be abused affects all firms, but this problem is particularly challenging for financial institutions, especially banks. Whereas a typical non-financial company has only a few lenders with relatively large positions, a typical bank obtains funding from thousands or even millions of lenders, each of whom is small relative to the bank. Because their number is small, the lenders to a non-financial company are better able coordinate on pursuing their common interest in monitoring and control. Such coordination is all but impossible for the lenders to a bank.

The fragmentation of lenders and the implied coordination problem are a major reason why banks can and do borrow excessively, beyond the level they would choose with an effective *ex ante* commitment. Suppose that an already indebted bank negotiates with a new lender, unbeknownst to the other lenders. The additional debt harms the other lenders because they face a higher default risk and possibly lower returns in the event of default. The new lender however may be willing to provide the additional loan anyway if he is given special terms with a sufficiently high interest rate and collateral securing the loan. But then the other lenders are hurt by the increase in default risk and the separation of the collateral from the set of assets available to creditors in default. If the damage to the other lenders exceeds the benefits to the bank and the new lender, the total social cost of the additional loan is larger than its benefits. If, in addition, the new loan imposes risks and costs on the rest of the financial system and on taxpayers, the inefficiency is even greater.

Effective leverage regulation can improve on *laissez-faire* outcomes by providing a mechanism of commitment. If supervision enforces the regulation, banks are effectively prevented from borrowing as much as they would under *laissez-faire* when they cannot commit to a limit on their overall borrowing. Leverage regulation in effect serves as substitute for the debt covenants that depositors and

³ The observation that this requirement is unrealistic is the starting point of the so-called *theory of incomplete contracts*; see, for example, Hart (1995).

other lenders are unable to put in place and enforce in order to commit the bank to be sufficiently safe. The need for regulation as a substitute commitment device is even greater if the creditors' incentives to monitor are weakened by a prospect of government or central bank support.

2. The Inefficiency of *Laissez-Faire* in Banking

We start our discussion of the welfare implications of banks' funding by considering an important and special function of banks' debt, namely that it provides *liquidity* to banks' creditors. In addition to the monetary returns that deposits and other short-term debt provide to their holders, the depositors and short-term creditors of banks attach a special value to their ability to convert their claims into cash quickly and to use them for payments.

The word "liquidity" requires an explanation. In the classical formulation of Keynes (1930, p. 67), an asset is said to be more liquid than another if it is "more certainly realizable at short notice without loss". An asset that is surely and immediately realizable without loss may thus be called "perfectly liquid".⁴ For assets that are not perfectly liquid, there may be tradeoffs between the different dimensions inherent in Keynes's formulation, the size of the expected loss in a sale, the degree of uncertainty about this loss, and the duration of the sales procedure.⁵

Under this definition, in the absence of hyperinflation, *cash* is perfectly liquid because it can immediately be used in every transaction without any discount. In the absence of concerns about bank solvency, bank deposits are close to being perfectly liquid because, through checks, credit cards, or bank transfers, in most transactions, they can also be used for immediate payments without discounts. The same is true of holdings in money market funds that can be used for transactions. In contrast, listed securities cannot be used in arbitrary transactions, but if the markets for these securities work well ("are liquid"), they can easily be converted into cash.

Among the different assets, cash stands out in that it is not a claim to anything. The liquidity of cash is due to its being the means of payment, which is generally accepted as long as participants have confidence in the currency. In contrast, bank deposits are claims on the banks, and their liquidity depends on investor confidence that the banks can make good on these claims.⁶ If this confidence vanishes, bank depositors may find that their holdings are not so liquid after all.

⁴ For an extensive discussion, see Hicks (1962).

⁵ Even so, Keynes (1930) used the definition to assert unambiguously that "bills and call loans are more liquid than investments" and "investments are more liquid than advances".

⁶ Whereas holdings in money market funds are officially treated as shares, promises of "stable net asset value" of one dollar per share give the appearance that these shares also provide their holders with fixed claims. This

The literature on banking mostly focuses on how a bank whose own investments consist of highly illiquid loans can make good on promises of paying depositors whenever they ask for it. Typical answers are: First, if there are many small depositors with payment needs that are statistically independent, then, by the law of large numbers, only a fairly determinate fraction of depositors will ask for their money at any one date, so it suffices to have a cash reserve for servicing these depositors; the remaining funds can be invested in illiquid loans.⁷ Second, if customer payments result in a net outflow of funds from a bank, the bulk of the payments will go into accounts with other banks, and the banks that lose funding can use interbank borrowing to substitute for the lost deposits.⁸ Third, if the bank's loans could somehow be made liquid, the bank might sell them in order to meet its obligations to depositors; this is one of the putative advantages of securitization, which involves packaging large numbers of loans together and creating different "tranches" of claims to the packages, with different levels of priority, so that the most senior tranches may have little default risk and may be tradable in liquid markets.⁹

Apart from concerns about bank runs and about potential incentive distortions in securitization, this literature tends to take the view that the extent of liquidity creation by banks that we see is efficient. After all, investors cherish the liquidity of the assets that banks provide. Little attention is paid to the fact that deposits are a form of debt, i.e., that they are liabilities of the bank and thus may pose a risk to the solvency of a bank. To the extent that the issue is considered at all, the fact that the claims of a debt holder do not depend on the borrower's asset returns is praised as making these claims "information insensitive" and thereby enhance their liquidity, e.g. by making bank notes and checks acceptable means of payment or by making super-senior mortgage-backed securities tradable.¹⁰

In contrast, we consider the implications of solvency risks for liquidity provision by banks. If the bank is heavily indebted and its asset returns are uncertain, insolvency is a real risk. If the bank becomes insolvent and if it does not receive outside support, e.g. from the government, it will end up in default or in bankruptcy. At that point, if not earlier, the liquidity benefits on which depositors count will no longer be available.

is why the Reserve Primary Fund's "breaking the buck" after the Lehman bankruptcy came as a big surprise and induced a panic among investors in money market funds. See Admati and Hellwig (2013 a, Chapter 5).

⁷ See, e.g., Diamond and Dybvig (1983).

⁸ This idea plays a crucial role in the theory that banks do not fund with deposits but banks create deposits by lending. For the individual bank, the latter statement is correct at the level of flows of new lending, but problematic at the level of stocks of loans (and other assets) whose counterparts in the balance sheet include stocks of outstanding deposits. Even for the individual bank, however, this funding problem at the level of stock variables is unimportant if any outflow of deposits can be neutralized by interbank borrowing. See, e.g. Jakab and Kumhof (2015).

⁹ See Gorton (2010).

¹⁰ See Gorton (2010).

The risk of the bank's becoming insolvent is greatly reduced when the bank funds with a substantial amount of equity in addition to deposits and other forms of debt. If the bank issues additional equity and uses the proceeds to buy more assets, these assets can be used to pay the debt and avoid default or insolvency. Because depositors and other debt holders have priority over shareholders, the additional equity and the assets it funds enhance the safety of deposits and other debt and help secure the liquidity benefits provided by deposits.¹¹ In the absence of government support, prospective depositors and other market participants who are aware of these issues might therefore insist that banks have substantial equity funding, and the banks might actually want to use substantial equity funding as a means of attracting deposits.

The question then is whether arrangements under *laissez-faire* are likely to be efficient. We study this question in the remainder of this section. We do not go into the specifics of how banks "create liquidity" through funding with deposits but merely assume that, because of the liquidity benefits they expect, investors attach value to deposits (or other short-term debt) over and above the monetary returns they offer. We also assume that in the event of default of a bank, under *laissez-faire*, i.e., in the absence of government support, there are no liquidity benefits from deposits. From an *ex ante* perspective, therefore, the value investors attach to deposits depends on their assessments of the bank's default probability.

We will argue that, in this setting, market outcomes under *laissez-faire* will actually involve inefficiently high levels of bank indebtedness. The inefficiency is likely to arise even if bank failures impose no collateral damage to third parties, such as taxpayers. Equity regulation can therefore improve on market outcomes. The inefficiencies provide an additional rationale for regulation on top of the harms banks can inflict on the economy.

2.1 The Impact of Creditor Fragmentation

The terms under which the bank can raise debt and equity are in part determined by "expected returns" that must be offered to compensate these claimholders for their foregoing other investment opportunities and for agreeing to bear the risks of the claims they acquire. For depositors and short-term debt holders the terms are also based in part on the liquidity benefits they receive as long as the bank does not go into default. Because of these liquidity benefits, depositors and short-term lenders will be willing to accept a lower interest rate than they would if they only consider the promised debt

¹¹ For a thorough discussion of this point, see Admati and Hellwig (2013 a, Chapter 10).

payment. *Prima facie*, therefore, as long as the bank does not default, funding by debt that provides liquidity may seem like a particularly cheap source of funding.^{12 13}

However, if the bank funds itself almost entirely with debt, its default probability will be very high. For a given value of asset holdings, the greater is the bank's obligation to debt holders, the greater is its default probability. With a greater probability of default, the liquidity benefits are less likely to materialize, and investors will ask for higher interest to compensate for this loss. The bank's initial owners thus face a tradeoff: whereas debt funding appears like a cheap source of funding for fixed liquidity benefits, the per-dollar cost of debt funding itself may be lower if the bank has issued more equity, because the increase in expected liquidity benefits provides additional compensation to the bank's creditors.

What funding mix will arise under *laissez-faire*? The answer depends on the way the bank and its investors arrive at the terms of funding. Suppose first that a bank is able to fully commit *ex ante* to an investment policy and to a funding policy, i.e. to make a binding announcement concerning the investments it will undertake, the riskiness of these investments, the fraction of the investments that it will fund by borrowing, and the payments it will promise to debt holders. On the basis of this announcement, investors then form an opinion about the bank's default probability and about the prospects for monetary returns to debt and equity and the liquidity benefits of debt. Investors will provide funding if the offered terms are attractive enough.

The bank's commitment to a funding policy and an investment policy is similar to the announcement of a quality specification for a car or any other good that can be provided in different qualities. The funding and asset policies are effectively quality parameters that determine the bank's default probability and the prospect that liquidity benefits will be enjoyed. If *ex ante* commitments of banks are in fact binding and if there is no additional collateral harm from bank defaults, then market outcomes under *laissez-faire* may be presumed to be efficient, or at least no less efficient than outcomes in any other market in which suppliers must choose the quality as well as the price of objects put on the market. In such markets, suppliers find that, although higher quality is more expensive to provide, it may still be worthwhile to do so if buyers are willing to pay for it.

Will market outcomes under *laissez-faire* and binding commitments involve the use of equity by banks? Of course, in the very special case where the bank's assets are entirely safe with no risk of losses and thus of default, there would be no point in issuing equity. In that special case, creditors

¹² This consideration leads DeAngelo and Stulz (2015) to claim that "high leverage is optimal for banks."

¹³ Liquidity provision may involve some costs, for branches, ATMs, and payment services. However, the bank can also charge fees for its services. In one form or the other, depositors are willing to pay a premium for the liquidity benefits that the bank provides.

would enjoy the liquidity benefit from bank debt for sure and equity does not enhance the quality of the debt. If the banks' assets are risky though, we can expect banks to issue some equity as well as debt, thus enhancing the likelihood that creditors enjoy the liquidity benefits.

However, the assumption that banks make effectively binding commitments about their funding and investment policies is highly unrealistic. For commitments to be binding, they must be enforceable, by legal means or otherwise. Legal enforceability presumes that the stipulated behaviors can be observed and verified. If such behaviors can be made to depend on extraneous developments, the relevant conditions must also be observable and verifiable by the enforcing authorities. This latter condition is unlikely to be met in practice. Legally enforceable commitments may therefore be too rigid, i.e., allow too little conditioning of behaviors on ongoing developments, to be worthwhile. If such promises are nevertheless made, the banks will at some point want to break them; when they do so, the depositors and short-term creditors are not likely to be in a position to enforce the promises and control the banks' behavior.

To see this point, note that bank debt funding generally comes from numerous small investors. The number of bank depositors ranges between thousands for small banks and millions for large banks. When it comes to bank funding through money market funds and other wholesale investors, matters are not very different. Reserve Primary, the money market fund that was effectively destroyed by the Lehman Brothers bankruptcy, provides an example. Reserve Primary had provided only between one and two thousandths of Lehman Brothers' total funding, some \$800 million out of more than \$600 billion; the rest was held by many other creditors with similarly small positions. The fragmentation of creditors makes it hard or even impossible for creditors to coordinate their actions. Any one creditor acting in his or her own interest is unlikely to take account of the collective interests of creditors as a whole. Instead of endeavoring to control the bank's overall risk and leverage, each creditor will then ask for substantial collateral and for a high interest rate.

To understand the implications of fragmentation, suppose that a bank has issued equity and debt in accordance with some previously announced funding policy. Consider a negotiation that a bank might have with a prospective new lender, which is not observed by other investors. If the bank proposes to borrow more without also raising additional equity, the prospective creditor will say yes if the bank provides him with compensation or protection for the extra risk. Compensation may take the form of a higher interest rate and protection may take the form of collateral for this particular loan that is separated out from the other assets.¹⁴

¹⁴ Admati and Hellwig (2013a, Chapter 10).

Can the bank and the prospective new creditor find terms to which they both agree? The answer is typically yes. If the new loan is small relative to the total amount the bank borrows, the increase in indebtedness has only a small effect on the bank's default risk. From the lender's perspective, the risk of losing liquidity benefits because of a default is hardly different than it is for the other lenders. However, the benefit the creditor obtains from the higher interest rate or from the collateral protecting his loan can be made large enough to make the loan attractive. .. From the bank's perspective, the additional debt funding increases the returns to shareholder in the event where there is no default.

The underlying reason why the new loan can benefit both the bank's shareholders and be attractive to the prospective new lender is that the costs of the agreement are largely borne by the bank's *other* lenders, whose interests neither the new lender nor the bank's shareholders or managers internalize.¹⁵ Other lenders suffer because the bank is more likely to go into default and because their returns in the event of default are diluted by the new debt.

Lenders may anticipate such behavior from the beginning. Each lender will form expectations about what may be going on in the negotiations with other lenders and what the overall debt ratio and the default probability will be. However, if the lenders cannot coordinate their behaviors, each negotiation will proceed on the pattern just described. The problem arises regardless of whether negotiations take place sequentially, at different times, or at the same time, with different lenders in different places.¹⁶ Relative to the outcomes that would be achieved in a world in which banks can make binding commitments, the overall *laissez-faire* outcome with fragmented negotiations will involve more borrowing, higher interest promises, higher default probabilities, and lower levels of welfare, due in particular to a lower expectation of liquidity benefits from bank debt.

Because of the fragmentation of lenders and the banks' inability to commit fully to their overall investment and funding policies, there is an additional conflict of interest between the banks and their lenders, which harms the efficiency of the market outcome. Statutory regulations that substitute for the missing ability to commit can therefore improve on the *laissez-faire* outcome. For example, statutory equity requirements place an upper bound on bank borrowing. If this regulation is reliably enforced by the supervisors, it can raise welfare by effectively committing the bank to a safer funding mix that enables more reliable liquidity provision and prevents the harm of excessive borrowing and risk of default. The increase in the share of equity in the funding mix also reduces incentives to pursue excessively risky investment policies, which further mitigates the distortions and efficiency losses from the lack of commitment..

¹⁵ Admati et al. (2018).

¹⁶ Brunnermeier and Oehmke (2013).

2.2 Leverage Dynamics

If banks engage with lenders sequentially over time (as actual banks do), the fragmentation of lenders is unavoidable. In this case there is an obvious conflict of interest between lenders in earlier debt contracts and lenders in subsequent debt contracts. Prior coordination between these different lenders is not possible if later lenders are not yet present at the time that earlier contracts are concluded.

In this setting, at any one time, debt holders whose claims from past lending have not yet matured may be like sitting ducks that can be taken advantage of by the borrower and new lenders. Debt covenants meant to create some commitment, may provide little protection because they are costly to enforce. If new lenders are not concerned about being themselves negatively affected by subsequent funding choices, then the bank would prefer to increase the amount of debt and harm these creditors later. If potential new lenders are concerned about being negatively affected by subsequent funding choices, they will try to protect themselves as best they can, for example by insisting on higher interest rates.

In Admati et al. (2018), with coauthors Peter DeMarzo and Paul Pfleiderer, we have explored the forces that affect the choice of funding mix once debt is in place. In particular, we show that, if a firm with a significant amount of outstanding debt has a one-time opportunity to adjust its funding mix while terms under which it previously obtained funding remain the same, then it is *never* in the shareholders' interest to use this opportunity to reduce indebtedness, for example by raising new equity and buying back debt. By contrast, it is *always* in the shareholders' interest to increase the amount of debt in the funding mix, for example by issuing new debt that is senior to or *pari passu* with existing debt. If there is a tax advantage to additional debt, it is in the shareholders' interest to increase indebtedness even if new debt must be junior to all existing debt and even if the current debt level is the result of previous optimization. These conclusions hold no matter how heavily the corporation is already indebted and independent of the costs associated with bankruptcy, which shareholders do not bear because of limited liability. They also apply to corporate decisions on retentions and distributions; the shareholders of a firm with a significant amount of debt outstanding have a strict preference for payouts over retentions and reinvestments.

In Admati et al. (2018), we also show that what we call the *leverage ratchet effect* creates corporate funding dynamics in which shareholders choose to increase indebtedness when exogenous changes make borrowing more attractive but never choose to reduce indebtedness. If creditors are apprehensive about subsequent increases in leverage and charge higher interest to the borrower, initial

indebtedness may be relatively low, but even then, indebtedness will eventually become inefficiently high when the ratchet dynamics play out.¹⁷

Creditors might try to protect themselves by writing covenants, but unless additional borrowing is precluded altogether, such covenants may end up shifting the problem elsewhere, rather than solving it. For example, if covenants preclude the issuance of new debt with the same priority or with higher priority than outstanding debt, incumbent creditors can still be diluted through the issuance of new debt with shorter maturities; even if this new debt is junior, it becomes effectively senior to all debt with longer remaining maturities because it matures earlier. To avoid becoming victims of this effect, lenders might themselves want to insist on short maturities from the beginning. Brunnermeier and Oehmke (2013) show that, under *laissez-faire*, the resulting *maturity rat race* leads to outcomes with most debt having extremely short maturities even though welfare might be higher if maturities were longer and banks less fragile. Moreover Admati et al. (2018) show that, even when maturities are very short, the leverage ratchet dynamics tend to drive debt to inefficiently high levels. As mentioned above, even if any newly issued debt must be junior to all existing debt, the leverage ratchet dynamics come in as long as an increase in debt generates additional tax benefits.

2.3 The Weakness of Creditor-Imposed Discipline

It has been suggested by some that the prominence of short-term funding of banks is useful because the fear of withdrawals by creditors imposes discipline on bank managers.¹⁸ In fact, fragmented creditors, particularly if they can withdraw their funds easily, have little incentive to invest in monitoring banks' risks from additional borrowing or from their investments. Moreover, in virtually all jurisdictions depositors are currently protected by deposit insurance, which eliminates any incentives for them to monitor at all.

Money market funds and other wholesale lenders are not protected by deposit insurance, but they usually ask for collateral as a means of protection. When banks use collateral to obtain funding, the lender is not concerned about the bank's overall leverage but is instead focused on the "haircut" that is imposed, which is the difference between the value of the collateral and the size of the loan they are making. If lending takes the form of a so-called repo contract, with the fiction that the collateral is "sold" to the lender and "repurchased" by the borrowing institution on the following day or week,

¹⁷ For an illustration of the argument, including the game-theoretic analysis of borrower-lender interactions in randomly changing environments, see Section 3 of Admati et al. (2018).

¹⁸ Diamond and Rajan (2001), French et al. (2010).

lenders are even exempt from a stay in bankruptcy through “safe harbor” rules, so they feel even safer than other secured lenders.¹⁹

Monitoring incentives would be stronger if there were no deposit insurance and if there were no exemption of collateral from bankruptcy proceedings. But even then, it is unlikely that monitoring would work well. Given the fragmentation of lenders, coordination is very difficult, and free-rider problems are important. Why should any lender with a small loan make any nontrivial investment in monitoring to impose discipline on management when the benefits of such discipline will be small to that lender? The benefits to all lenders may be large but any individual lender would rather have others make that monitoring investment and freeride on the results. The free-rider problem might be overcome by the consideration that a lender who is active in monitoring might be the first to hear of an impending default and therefore also first in line to get his money back. But the desire to be first in line when things go wrong also creates a risk of an inefficient run that can take down even a healthy bank.²⁰

In any case, an investment in monitoring is only worthwhile if there is a significant chance of things going wrong so that the potential gains are large enough to cover the cost. In contrast, the idea that bank debt provides liquidity is predicated on the likelihood of default being very small so that deposits are “informationally insensitive” and can reliably be used for making payments.²¹

If the bank’s shares are listed on a public exchange, lenders might actually free-ride on the information contained in stock prices. Since shareholders returns are very sensitive to the returns on the banks’ assets, shareholders have much stronger incentives to invest in information and this information is potentially valuable at all times, not just when things go badly. The information they gather affects stock prices, so stock prices provide a free source of information on how the bank is doing. For lenders, it makes sense to look at the borrower’s stock prices and not to invest in monitoring at all if stock prices indicate that all is well. In such a situation, there is no reason to expect uninsured

¹⁹ The insulation of collateral from the effects of bankruptcy comes at the expense of those lenders whose claims are settled in bankruptcy proceedings. It is thus another example for the possibility that the borrower and a new lender can write contracts at the expense of other lenders. The effect is particularly strong when, in the run-up to a possible bankruptcy, repo lenders insists on lever larger haircuts. Morrison et al (2014) argue that the safe harbor exemption of repos contribute to the fragility of the financial system; see also our discussion in Chapter 10 of Admati and Hellwig (2013a).

²⁰ See Diamond and Dybvig (1983).

²¹ See Gorton (2010). In Admati and Hellwig (2013b), we give an extensive discussion of the tension between the “liquidity explanation” of bank funding by short-term debt, which requires this debt to be information insensitive, and the “discipline explanation”, which requires debt holders to take an interest in constant monitoring.

depositors and short-term bank lenders to impose discipline on bank managers and prevent the managers from increasing the bank's leverage.²²

The experience of the decade before the financial crisis of 2007-2009 accords with our analysis of leverage dynamics without creditor discipline. During this decade, the leverage of large banks went up significantly, without any imposition of discipline by debt holders. Share prices went up until the crisis broke. In the case of Lehman Brothers, the final run by money market lenders was triggered by a stock market fund manager selling the stock short and announcing that Lehman had large hidden losses – monitoring by stock market investors rather than debt holders.²³

3. The Social Costs and Benefits of Leverage Regulation

The discussion above suggests that *laissez-faire* markets lead to excessive levels of leverage for banks, levels that are excessive even in the absence of systemic effects and potential damage from bank failures to the rest of the financial system and the overall economy. If the possibility of bank failures creates systemic risk and harms un-related third parties, this collateral harm provides an additional compelling reason for considering *laissez-faire* to be inefficient.

Regulation that constrains banks' use of debt can address these market failures. If such regulation is enforced effectively, it can provide a substitute for the missing commitment powers of banks in their interactions with their creditors. The commitment created by equity regulation enables banks to provide liquidity and make loans more reliably to their creditors by being safer.

Equity regulation also serves to constrain systemic risk and harms to third parties that are caused by bank failures and bank distress. In particular, if the government uses deposit insurance and other guarantees to contain such damage and to ensure the liquidity of deposits, there is a *prima facie* case for regulation to reduce the expected costs of such protection and counter the incentives banks have to take more risk and engage in more borrowing in order to increase the value of the insurance relative to its cost. As discussed above, deposit insurance eliminates incentives for depositors to engage in monitoring or to impose covenants that would restrict banks' risk taking and borrowing, thus exacerbating the other effects. As before, regulation can provide a mechanism of commitment, thus providing a substitute for missing or ineffective debt covenants. Constraining the extent of bank borrowing thus helps banks perform all their usual functions, including liquidity creation and lending.

²² The resulting dependence of creditor behavior, in particular, the laxness of lending standards, on stock prices may play a role in the mechanisms underlying so-called leverage cycles (Geanakoplos, 2010).

²³ See Admati and Hellwig (2013b) and Admati et al (2013, Section 5).

Of course, for regulation to work, regulators must have the authority and the political will and the ability to monitor banks and to enforce the regulation effectively.

Regulation to reduce banks' indebtedness and increase its reliance on equity produces another benefit by reducing the distortions of investment decisions that are caused by heavy borrowing. It is well known that, corporations are heavily indebted, the conflict of interest between shareholders and creditors causes inefficient investment decisions that reduce the overall value of the heavily indebted firm. First, heavily indebted firms may choose to shift risk to creditors by making risky investments that benefit shareholders while reducing the value of creditors' claims, because shareholders benefit fully from the upside while sharing the downside with creditors. Second, the shareholders of heavily indebted corporations may avoid taking worthy investments that are relatively safe. This avoidance occurs because some of the value created by the investment may accrue to the creditors because their claims become less risky and more likely to be paid in full. When banks are distressed, they frequently stop lending, which creates a credit crunch that also motivates bailouts and other forms of support. With more equity, this problem too would be alleviated.

Finally, when banks incur losses and face trouble in rolling over their short-term funding, they may engage in selling assets even at distressed "fire-sale" prices. The less equity the bank employs, the larger is the fraction of the equity that disappears when asset values decline. Generally for a given level of losses a bank with high leverage and little equity must sell much more of its assets to become safer again than does a bank with less leverage and more equity. If many institutions sell assets at the same time and these assets are opaque, asset price declines exacerbate the weakness and make the situation worse. It is thus more likely that lending to businesses and households might freeze and, again, bailouts and supports might have to be provided, as they were in October 2008. With more equity, the "fire-sale" dynamics would be much weaker, and bailouts might not be needed.

Since the benefits of regulation that require banks to use much more equity are so substantial, are there significant social costs associated with such regulations? If regulations prevented banks from taking on *any* debt, it would preclude their taking deposits and providing liquidity, since deposits are a form of debt. However, the equity requirements that we now have are very far from such an extreme. Basel III still requires banks to fund at least *three* percent of their assets with equity, thus allowing them to fund up to 97 percent with debt. An increase in the required ratio for equity relative to assets can be realized by raising more equity, without any change in the amount of borrowing. The additional equity makes banks safer and thereby enhances the liquidity benefits that investors obtain from their deposits and other forms of short-term debt.

As we show in detail in Admati et al. (2013) and Admati and Hellwig (2013a, 2013b, 2015), the costs associated with significantly higher equity requirements are entirely private to the banks'

managers and shareholders, because with more equity they are less able to benefit from tax and other subsidies and are less able to shift risks and costs to taxpayers and the public. These subsidies are provided to banks only when they borrow. Reducing the subsidies by the use of more equity entails no social cost. While elimination of these subsidies has often been stated as an objective of the reforms undertaken after the crisis and many bankers and policymakers claim that implicit subsidies are no longer present, empirical studies show that the subsidies are still substantial.²⁴ The persisting implicit and explicit guarantees continue to weaken investor monitoring and create moral hazard and distortions.

An increase in equity requirements does not actually force banks to reduce their funding by deposits or other short-term liabilities and the liquidity benefits that investors love. Banks could also raise additional equity in the market, or, over time increase their equity internally by retaining profits without reducing their deposit funding. They might use the additional funds for additional lending or for buying additional assets in the open market. As was shown by Admati et al. (2012), the latter can be done without adverse incentive effects on bank managers.²⁵

In the political debate, banks often claim that equity is expensive, so that, if equity requirements were tightened, the rates they charge for their loans would have to increase and some loans might not be made altogether. However, from the perspective of society as a whole, low interest rates on bank loans are not necessarily desirable. Loans should be made at interest rates that reflect the actual social costs of the funds being lent. If loan rates are low because of tax benefits and government subsidies through guarantees, bank lending to households and businesses may actually be excessive and wasteful. The expansion of mortgage lending in the years 2002-2007 in the US, Spain, Ireland and elsewhere provides an example. The ultimate social costs were enormous.²⁶

If policymakers determine that bank loans are too expensive or that too few are made in a particular area (e.g., to small and medium enterprises), the proper remedy would be to intervene and target this problem directly, for example by subsidizing specific forms of bank lending in certain circumstances. There may also be ways to support desired activities without relying on financial intermediaries to deliver the support (for example, by giving tax credit to first-time home owners to be

²⁴ See, for example, Kelly et al. (2016), and Gudmundsson (2016). Admati (2014) discusses the challenge of estimating the subsidies.

²⁵ See also Admati et al. (2013, Section 7). Note that, if the funds raised by issuing equity are invested in the open markets for shares and debt securities of other firms, the operation need not involve any net inflow of cash into banks. The question of where would all the new equity funding come from would be moot because the cash raised would be given back to the market right away. The only thing that changes is the structure of ownership of claims to returns from the different firms in the markets.

²⁶ For more general treatments of excessive borrowing by the “real economy”, see Mian and Sufi (2015), Schularick and Taylor (2012).

used for down payment instead of subsidizing mortgage debt to fund home ownership). Such targeted support is better than blanket subsidies to bank borrowing. Subsidies to bank borrowing often have little effect on bank lending because banks have significant discretion in how to use their funds, and they may prefer to gamble in risky securities rather than make socially desirable but “boring” loans.

There have been many attempts made to support the mantra “equity is expensive” in banking. In past writings such as Admati et al. (2013), we classified the claims and arguments that are put forwards as “fallacies, irrelevant facts, and myths,” where “irrelevant facts” involved claims referring to private, rather than social costs and benefits of equity funding and “myths” involved theoretical models explaining why “banks have to fund with short-term debt.”²⁷ Most of the myths appear to represent an exercise in “reverse engineering” as discussed in Pfleiderer (2018). They also reflect the presumption that *laissez-faire* outcomes are efficient. As we have argued here, this presumption is unwarranted.

4. Concluding Remarks

At a conference at a central bank some time ago, Martin Hellwig was asked why he was dissatisfied with the regulatory reforms that have been implemented since 2008. In reply, he in turn asked, whether the crisis would have been avoided if all the reforms that have been introduced since 2008 had already been implemented in 2000. A former central bank governor who listened in immediately said “No!” Ten years after the Lehman Brothers bankruptcy, many of the key drivers of the crisis are still present, and the financial system changed too little and is still is unsafe. The repeated claim by policymakers that the system is safer now is akin to claiming that roads are safer if the speed limit for trucks loaded with explosives is lowered from 100 miles per hour to 95 miles per hour – perhaps a tiny bit safer but still extremely unsafe, especially if authorities rely on the truckers’ own speedometers to measure speed and these speedometers can be manipulated.²⁸

The massive supports that governments and central banks provided to banks and many other financial institutions in the crisis succeeded at preventing the implosion of the financial system and staving another Great Depression. One consequence of the success was that the industry and its lobbyists lost little if any of their ability to influence policy in ways that benefit the industry but harm

²⁷ In Admati and Hellwig (2013a) we called the flawed claims “the bankers’ new clothes”, arguments that lack valid substance. In Admati and Hellwig (2015), we inspected the continuing “parade of bankers’ new clothes, debunking 31 flawed claims.

²⁸ The speedometer analogy refers to the calibration of equity requirements on the basis of the banks’ own risk models; see Admati and Hellwig (2013, Chapter 11) and Behn et al. (2016)).

the public. They continued to advise governments, parliaments, and regulators on the path of reform almost as if the crisis never happened. Their influence contributed significantly to the weakness of Basel III, with warnings about the impact of equity requirements on lending and growth having an impact even though most of them involved fallacies, irrelevant facts, and myths.²⁹

The reform of equity regulation, which in our view is the most powerful tool for supporting financial stability and reducing systemic risk as well as distorted decisions, did not receive much public attention. Negotiations for Basel III took place behind closed doors in the Basel Committee for Banking Supervision and were effectively completed before the public in most countries had even become aware of the matter. These negotiations were not based on any deep scrutiny of the causes of the crisis; in fact the new Basel Accord was concluded even before any of the official inquiries into the causes of the crises had been completed.³⁰

Major weaknesses of previous regulation (“Basel II”) were left in place, for example the excessive reliance on the banks’ own models for risk assessments and the determination of required equity and the failure to take account of certain risks altogether, such as default risks of sovereigns in their own currency or the risks attached to short-term funding of long-term assets in the bank book.³¹ Basel III did introduce a “leverage ratio requirement” so that, regardless of how safe the bank might proclaim itself to be, equity must not be less than three percent of total assets, the ratio Lehman Brothers had in the last balance sheet before they went bankrupt. In November 2010, a letter to the *Financial Times* from 20 leading academics in the area of banking of finance, including (by now) two Nobel laureates, protested the inadequacy of Basel III and called for requiring equity to be at least fifteen percent of total assets (compared to three percent in Basel III), but by then the new Basel Accord had been concluded.³²

Reluctance to impose tougher regulation is often justified by fears that such regulation would make it difficult for banks to compete with unregulated institutions and that a shift of risky activities

²⁹ In May 2010, a particularly outrageous statement from the British Bankers Association asserted that the Basel proposals would require British banks to “hold” more equity amounting to 700 billion pounds, and that this amount would not be available for lending. Since equity is a mode of funding rather than a cash reserve, this claim was outright nonsense. The lobby’s willingness to use such nonsense was witness to their sense of mastery of the proceedings. Connaughton (2012) quotes Paul Volcker, past Chair of the Federal Reserve, telling Senator Ted Kaufman in January 2010 “just about whatever anyone proposes, no matter what it is, the banks will come out and claim that it will restrict credit and harm the economy.... It’s all bullshit.”

³⁰ For example, the report of the Financial Crisis Inquiry Commission appointed by the US Congress (FCIC 2011) came out after Basel III had been agreed upon and after the Dodd Frank Act has been signed into law.

³¹ Behn et al. (2016) provide strong empirical evidence that internal risk assessments of loans are more optimistic, and in fact too optimistic, when they are also used to determine the equity needed to back the loans.

³² See Admati et al. (2010). In an Op-Ed the next day in the same paper, the CEO of Citigroup argued that “we must rethink Basel or growth will suffer,” illustrating the uphill battle of anyone trying to take on the industry on.

from banks to these unregulated institutions would be very dangerous. Unregulated institutions, the so-called shadow banks, serve as a bugbear to warn against any regulation. However, the argument begs the question whether shadow banks are actually so dangerous and, if they are, why they remain unregulated.

In fact, some kinds of shadow banks, namely hedge funds and private-equity firms, have so far not caused much of a danger to financial stability. In the financial crisis, the most harmful shadow banks were actually the creations of regulated banks, special purposes vehicles that the banks used to circumvent regulations by holding assets outside their balance sheets and funding them through the market, with explicit or implicit guarantees. When market funding broke down, in the summer of 2007, the sponsoring banks had to make good on their guarantees, and their balance sheets were much the worse for it, raising immediate doubts about capital adequacy and solvency.³³ If the supervisors had not tolerated these practices, the expansion of subprime securitization would have been much less extensive, and the impact of the subprime crisis would have been much smaller.³⁴ Yet, even today these practices continue; according to Singh and Alam (2018), off-balance sheet funding of financial institutions – and hidden leverage – is higher now than in 2007, before the crisis.

Money market funds are another set of shadow banks that played a detrimental role in the crisis. Whereas some authors consider the funding of banks and special purpose vehicles of banks by money market funds to be an example of socially useful liquidity creation through complex financial arrangements, the run by customers on these funds, and the run by these funds on banks, were crucial in the collapse of money markets after the Lehman bankruptcy;³⁵ the government even had to provide the money market funds with a kind of deposit insurance to end the runs. Even so, the regulation of money market funds has not changed much. The dependence of banks on the funds is still a source of substantial systemic risk.

Confusion, willful blindness, and conflicted interests on the part of many have combined to maintain a financial system in which incentives to harm and to take risks at the expense of others are insufficiently disciplined by either regulation or market forces. The enablers of this system include

³³ See Hellwig (2009), Acharya et al. (2013), Admati and Hellwig (2013, Chapters 5 and 13).

³⁴ Thiemann (2018) provides an extensive account of the politics behind this toleration. See also Hellwig (2018) for the regulatory treatment of German banks using special purpose vehicles to invest in “toxic” securities in the United States.

³⁵ See Gorton (2010) for the claim that “liquidity creation” through complex financial arrangements is useful. For critical assessments, see the empirical studies of Acharya et al. (2013) and Krishnamurthy et al. (2014), the former on distortions in the formation and funding of Special Purpose Vehicles to hold mortgage-backed securities, the latter on the nature of the so-called “run on repo” in September 2008, which was concentrated on the dealer banks. Both papers emphasize solvency concerns for the relevant issuers.

individuals from across the private sector and government institutions, as well as some economists and media.³⁶ The claim most frequently made is that “equity is expensive”.

Whereas the enablers argue that equity is “expensive,” it is actually the inefficiently high leverage and the inadequate levels of equity in banking that are expensive for society. Properly designed equity requirements are needed to deal with this problem.³⁷ The industry is strongly opposed to such requirements because they restrict the banks’ ability to borrow and take risks at the expense of creditors and taxpayers. When economists suggest that *laissez-faire* in banking is efficient and imply or state that equity regulation is harmful or expensive, they echo some of the flawed claims of the lobby. As we have shown, claims that *laissez-faire* in banking is efficient rest on special and unrealistic modelling assumptions. Once these assumptions are brought closer to reality and the implications of creditor fragmentation and weak commitment powers are considered, high leverage in banking is seen to reflect distortions rather than the mandate of efficiency.

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³⁶ As described by Admati (2017), the enablers of the dangerous financial system include individuals from across the private sector and government institutions, as well as some economists and media. After discussing the action and inaction of the enablers and their moral disengagement, she concludes that “change is possible, but it will take a village to repair a financial system.” A major challenge comes from the use of confusing jargon to exclude much of the public, and the politics of banking, where politicians tend to view banks as a source of funding and do not have enough incentives to care about risk.

³⁷ For a detailed discussion of the flaws in the existing design of capital regulations under Basel III, specific steps that can be taken immediately, and related policy recommendations see Admati and Hellwig (2013a, Chapter 11) and Admati (2016).

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