

Making Money: Leverage and Private Sector Money Creation

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I. INTRODUCTION

The turmoil in financial markets in recent years is encouraging some economists and financial theorists to undertake a major rethinking of how the financial sector influences the real economy, and in particular, to reexamine the linkages among financial innovation, supply of credit and money, monetary policy, bubbles, financial stability, and economic growth.¹ Prior to the financial crisis of 2007–2008, most finance theorists and macroeconomists tended to assume that financial market innovations would not be widely adopted or used unless they increased the efficiency with which the financial sector directed savings to invest-

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1. See, e.g., GARY B. GORTON, *SLAPPED BY THE INVISIBLE HAND: THE PANIC OF 2007* (2010); Margaret M. Blair, *Financial Innovation, Leverage, Bubbles, and the Distribution of Wealth*, 30 *REV. BANKING & FIN. L.* 225 (2010–2011); Samuel G. Hanson, Anil K. Kashyap & Jeremy C. Stein, *A Macroprudential Approach to Financial Regulation*, 25 *J. ECON. PERSP.* 1 (2011); Symposium, *Financial Plumbing*, 24 *J. ECON. PERSP.* 3 (2010); Symposium, *Financial Regulation After the Crisis*, 25 *J. ECON. PERSP.* 1 (2011); Symposium, *Macroeconomics After the Crisis*, 24 *J. ECON. PERSP.* 4 (2010); Tobias Adrian & Hyun Song Shin, *Financial Intermediaries, Financial Stability, and Monetary Policy* (Fed. Res. Bank of New York, Staff Report No. 346, 2008), http://www.newyorkfed.org/research/staff_reports/sr346.html; Tobias Adrian & Nina Boyarchenko, *Intermediary Leverage Cycles and Financial Stability* (Fed. Res. Bank of New York, Staff Report No. 567, 2012), http://www.newyorkfed.org/research/staff_reports/sr567.html; Morgan Ricks, *Reforming the Short-Term Funding Markets* (Harvard John M. Olin Center for Law, Econ., and Bus., Discussion Paper No. 713, 2012); Jeremy C. Stein, *Monetary Policy as Financial-Stability Regulation* (Nat'l Bureau of Econ. Res., Working Paper No. 16883, 2011); Gary B. Gorton & Andrew Metrick, *Regulating the Shadow Banking System* (Oct. 18, 2010) (unpublished manuscript) (on file with author); Robin Greenwood & David Scharfstein, *The Growth of Modern Finance* (June 2012) (unpublished manuscript) (on file with author).

ments in the real economy, which in turn would lead to greater efficiency or greater growth, or both.² But not lately.³ For example, Nobel Prize-winning economist Joseph Stiglitz told readers in an online debate sponsored by the *Economist* in 2012 that financial market innovation in the years leading to the crisis “was not directed at enhancing the ability of the financial sector to perform its social functions.”⁴ Adair Turner, Chairman of the United Kingdom’s Financial Services Authority, goes further, criticizing macroeconomists for failing to understand the consequences of excessive financial innovation, observing:

[O]ne of the most surprising and concerning deficiencies of macroeconomics over the last several decades, has been the limited extent to which it has incorporated detailed descriptions of banking and financial system dynamics within either its theory or its models. Putting right that deficiency and understanding well the functions of banks and the drivers of credit creation and credit allocation is one of the crucial challenges for modern economics.⁵

In support of these concerns about the role of finance, a number of recent empirical studies challenge the prior conventional wisdom that, on a country-by-country basis, larger financial sectors lead to higher growth rates.⁶

2. Jean-Louis Arcand, Enrico Berkes & Ugo Panizza, *Too Much Finance?* 3 (Int’l Monetary Fund, Working Paper No. 12/161, 2012) (“The idea that a well-working financial system plays an essential role in promoting economic development dates back to Bagehot (1873) and Schumpeter (1911).” (citing WALTER BAGEHOT, *LOMBARD STREET: A DESCRIPTION OF THE MONEY MARKET* (1873); J.A. SCHUMPETER, *A THEORY OF ECONOMIC DEVELOPMENT* (1911)). Raymond Goldsmith was the first to show the presence of a positive correlation between the size of the financial system and long-run economic growth driven by the fact that financial intermediation improves the efficiency rather than the volume of investment. R.W. GOLDSMITH, *FINANCIAL STRUCTURE AND DEVELOPMENT* 394–95 (1969). Andrei Shleifer, a finance theorist, recently told the *Economist*: “The standard argument for financial innovation is that there are gains from trade, but that model crumbles if you suppose that people do not fully understand the risks.” *Of Plumbing and Promises: The Back Office Moves Centre Stage*, *ECONOMIST* (Feb. 25, 2012), <http://www.economist.com/node/21547993> (quoting Andrei Shleifer).

3. Adair Turner, Chairman of United Kingdom’s Financial Services Authority, stated in a speech during the fall of 2011: “The question I will ask is how far we can rely on traditional policy levers to ensure that either the aggregate amount of credit created or its sectoral allocation is socially optimal. The answer I will give is not much. We need to challenge the idea that financial innovation is axiomatically beneficial in a social as well as private opportunity sense.” Adair Turner, Chairman, Fin. Servs. Auth., Speech at Southampton University: Credit Creation and Social Optimality (Sept. 29, 2011).

4. Andrew Palmer, *Playing with Fire: Financial Innovation Can Do a Lot of Good. It Is Its Tendency to Excess that Must Be Curbed*, *ECONOMIST* (Feb. 25, 2012), <http://www.economist.com/node/21547999>.

5. Turner, *supra* note 3.

6. Arcand et al., *supra* note 2, find that “the marginal effect of financial depth on output growth becomes negative when credit to the private sector reaches 80-100% of GDP.” *Id.* at 6 (discussing various studies).

Contrary to the beliefs of most macroeconomists, the financial sector in the United States has grown too large in the last few decades as a consequence of financial innovation that has encouraged the use of too much “leverage” (financing with debt) by financial institutions (as well as by consumers and other borrowers).

To be sure, credit used safely and prudently helps businesses and individuals invest more than they could if they were limited to using only their own savings, so it is extremely important to a healthy economy that credit be available. But relying on too much credit makes individuals and businesses vulnerable to even modest interruptions in income.

More importantly, by providing an alternative to money, credit acts like money in stimulating the economy. When financial institutions that provide credit to the real economy borrow too much and become overleveraged, they increase the risk of dangerous asset bubbles and make the financial markets unstable. Worse, excessive leverage in the financial sector can set the stage for sudden and catastrophic contractions when multiple financial institutions all try to deleverage quickly and at the same time.

Although, to avoid such situations, it is in society’s interest to restrict the extent to which financial institutions can borrow, it is generally not in the interest of the financial institution executives, fund managers, and traders to limit the amount of leverage they use. This is because the payoffs for financial firms operating with leverage are asymmetric—when times are good, leverage greatly enhances the profitability of financial firms as well as the paychecks of the people who work for them. But when the outcome of investments financed with leverage is bad, the people who invest in or work in financial firms rarely bear the full brunt of the losses their firms, and their creditors experience. In fact, there is good reason to believe that financial market participants are, on average, paid more the more volatile and bubble-prone the economy is, so they have little incentive to adopt prudent practices that help keep the economy safe from such disturbances.

In Part II, I connect the dots between excessive leverage, risk, and financial market volatility. In Part III, I explore the role that the “shadow-banking sector” has had in driving leverage. In Part IV, I explain why leverage at the level of financial institutions matters for the macroeconomy. In Part V, I argue that excessive leverage causes instability in financial markets and in the economy as a whole. Finally, I conclude by arguing that these problems in the financial sector will not be self-correcting because leverage has helped to drive up profits and incomes over time in the financial sector.

II. WHY LEVERAGE LEADS TO RISK AND FINANCIAL MARKET VOLATILITY

The pre-financial crisis conventional view of financial markets was that growth and innovation in the financial sector unequivocally improve the efficiency with which financial markets gather and direct resources to finance productive investment and help to allocate risk to those who can most efficiently bear it. While it may be a reasonable assumption in other sectors of the economy that innovations that are widely adopted are efficiency-enhancing (otherwise, why would business people adopt them?), that assumption may not be true in the financial sector. Financial services are transactions costs from the point of view of the rest of the economy. If financial innovations were making the delivery of those services more efficient, we might reasonably expect that the amount of economic activity devoted to finance would be declining as a share of total output. But the opposite has happened, and the financial sector now accounts for 7.5% to 8% of gross domestic product (GDP).⁷ This compares with about 2.5% in 1950, and 5% in 1980.⁸

Financial market regulators now confront a financial sector that has grown too large in several senses. First, the financial sector repeatedly out-innovates regulators and seems to grow fastest in sectors and niches that are outside the regulated parts of the sector, especially the banking system. Nonbank financial institutions that emerged in the years leading to the financial crisis to carry out bank-like transactions and services came to be called a shadow-banking system because, while this network has become integral to the way regulated banks operate, it operates largely outside the regulations that govern banks and other depository institutions.⁹

Activities in the shadow-banking system facilitate the use of much higher levels of leverage than can, or would, be used in the formal banking system. The shadow-banking system thereby engages in numerous transactions that might not have happened at all in the past because no bank or bank-like institution would have been willing, or permitted by regulators, to engage in such transactions. Many of these transactions may have facilitated useful investment in the real economy, but a substantial share of the additional transactions made possible by the shadow-

7. See Blair, *supra* note 1, at 279–84 (reviewing data showing the growth of the financial sector in the United States relative to the rest of the economy).

8. *Id.* Measuring the share of GDP going to finance is not straightforward because it is not clear how to measure the output of the sector. *See id.* at 288–90.

9. See generally Tobias Adrian & Hyun Song Shin, *The Shadow Banking System: Implications for Financial Regulation*, (Fed. Res. Bank of New York, Staff Report No. 382, 2009) (describing the emergence of this part of the financial sector), http://www.newyorkfed.org/research/staff_reports/sr382.html.

banking system have been wasteful or even destructive. Robin Greenwood and David Scharfstein, for example, find that in the last few decades, “shadow banking had the effect of lengthening the credit intermediation process, meaning that it introduced more links in the chain connecting household savers with borrowers.”¹⁰ The effect of those extra links in the credit intermediation process may have helped, to some extent, to allocate risks to parties who could better bear it, but it also added layers of complexity and opacity to the system. Once the crisis hit, it was much harder to unwind transactions, reduce leverage in the financial system, and restructure mortgages and other consumer loans to help families stay in their homes, make their mortgage payments, and otherwise pay their bills.

The shadow-banking system seems to have evolved largely for the purpose of hiding leverage from regulators or getting it outside the reach of regulators. Yet, prior to the crisis, regulators and legislators chose not to intervene and not to try to extend regulatory oversight to these new institutions and the financial instruments they issued, largely accepting the industry’s argument that less regulation and more innovation would lead to greater growth in the economy.¹¹

Second, some scholars and policy analysts have argued that problems in the financial system arose because some individual large banks and other financial institutions became “too big to fail.”¹² But a more serious problem is that the system in the aggregate became too large, and too highly leveraged, and thus created too much credit. Regulators were largely unable to prevent institutions outside the banking system from operating with excessive leverage and engaging in other high risk transactions, as American International Group (AIG) and many other institutions did.¹³ The Dodd-Frank Act,¹⁴ passed in the summer of 2010, ad-

10. Greenwood & Scharfstein, *supra* note 1, at 4.

11. Raghuram G. Rajan & Luigi Zingales, *Financial Dependence and Growth*, 88 AM. ECON. REV. 559, 561–62 (1998) (“There has been extensive theoretical work on the relationship between financial development and economic growth. Economists have emphasized the role of financial development in better identifying investment opportunities, reducing investment in liquid but unproductive assets, mobilizing savings, boosting technological innovation, and improving risk taking. All these activities can lead to greater economic growth.”).

12. *See, e.g.*, SIMON JOHNSON & JAMES KWAK, 13 BANKERS: THE WALL STREET TAKEOVER AND THE NEXT FINANCIAL MELTDOWN (2010).

13. AIG sold hundreds of billions of dollars of “credit default swaps,” which are highly leveraged bets that some underlying debt securities will not default. *See* Adam Davidson, *How AIG Fell Apart*, REUTERS (Sept. 18, 2008), <http://www.reuters.com/article/2008/09/18/us-how-aig-fell-apart-idUSMAR85972720080918>. When the underlying debt securities began to default, AIG could not meet its obligations to the firms that bought the credit default swaps without a massive infusion of capital from the Federal Reserve Bank and the U.S. Treasury. The U.S. government eventually put more than \$180 billion into AIG to keep it from failing. *See* Hugh Son, *AIG’s Trustees Shun ‘Shad-*

dresses this problem at best indirectly by authorizing the Board of Governors of the Federal Reserve System to take over the regulation of financial institutions if those institutions are deemed to be a threat to the safety and soundness of the financial system by the Financial Stability Oversight Council (FSOC), which was created by the Act to do a better job of identifying and regulating risky financial activities before they result in crises.¹⁵ But the process by which FSOC can designate institutions as systemic threats will likely prove to be highly political. Moreover, as happened in the 2008 crisis, it may not be clear which institutions constitute a threat until it is too late for regulators to prevent a panic aimed at assets in the shadow-banking system.¹⁶

Many economists and policy analysts may object to the assertion that the system is too large and too highly leveraged; this objection arises from widespread belief that an efficient and unregulated capital market will not, consistently and systematically, provide excessive credit,¹⁷ nor should it systematically finance inefficient investments. Standard economic theory tells us that any such problem should be self-correcting in a market economy: investors who provide financing to the banks and shadow banks should refuse to provide further debt financing if the institution becomes too highly leveraged. Further, if the prices of assets financed by such leverage are driven up by excessive debt financing, they should be less attractive as investments, encouraging investors to redirect their investment dollars.

Financial markets might not always be self-correcting even if all investors are fully rational, however. The reason is that finance is different from other sectors because what it creates is credit, and credit acts like a monetary stimulus to the economy,¹⁸ pushing up prices in the same way that printing excess money might be expected to drive up inflation. Unregulated financial firms can create an almost endless supply of credit

ow Board,' *Seek Directors (Update2)*, BLOOMBERG (May 13, 2009), <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aaog3i4yUopo&refer=us>.

14. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Pub. L. No. 111-203, §§ 112-13, 124 Stat. 1376, 1394-1420 (2010).

15. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Pub. L. No. 111-203, § 113, 124 Stat. 1376, 1398-1402 (2010) (codified at 12 U.S.C. § 5323).

16. Could FSOC, if it had been in existence prior to the financial crisis, have known that the financial products unit of AIG had become a critical linchpin in the international financial system prior to its near collapse in the fall of 2008, and rescue by the Federal Reserve and Treasury?

17. A few scholars are beginning to develop theoretical models in which the rational actions of individual participants in the financial system lead to excessive credit creation and excessive creation of private money. *See, e.g.*, Stein, *supra* note 1 (developing a model in which banks have incentives to create too much money).

18. Economists and finance scholars increasingly recognize that there is no clear distinction between "money" and other forms of short-term credit. *See generally* Blair, *supra* note 1; Ricks, *supra* note 1; Stein, *supra* note 1; Turner, *supra* note 3.

simply by operating at higher degrees of leverage.¹⁹ Leverage greatly enhances the return on equity for bank shareholders and other investors in the shadow-banking system in good times, when underlying asset values are rising. It also increases the losses in bad times, but those losses often fall on others, such as creditors of the financial firms. Moreover, neither creditors nor shareholders in a financial firm bear all of the costs when a financial firm fails. This is because the failure of a single institution may force that institution to sell assets quickly, and if the institution is large, this can drive asset prices further down, causing other institutions to have losses so that they too are forced to sell.²⁰ In extreme situations, taxpayers may be called upon to prop up troubled institutions to prevent a downward spiral of asset prices that can devastate the whole economy.

These factors imply a third sense in which the financial sector is too large: for the reasons reviewed above, and others explained below, individual institutions will tend to operate with leverage that is too high and will encourage customers to borrow too much. In this way, the financial system as a whole tends to generate too much credit if it is not prevented from doing so by regulators.²¹

The effect of excessive credit on the system as a whole can be explained by a simple analogy to the idea of the money multiplier and quantity theory of money from Economics 101. The idea behind the money multiplier is that the activities of the banks in the banking system have the effect of increasing the amount of money in an economy beyond the amount that is put into the economy by the Federal Reserve Bank (the Fed). Nonetheless, the Fed can roughly control the amount of money banks add to the economy by regulating banking activity. Through this mechanism, the Fed can try to prevent inflation by keeping the supply of money from growing too fast.²² An innovative financial sector, however,

19. Leverage” can be measured as the ratio of the total value of an asset to the amount of equity (or sometimes “capital”) used to finance the asset. In more traditional and common usages of the term, it means the ratio of debt to equity, or debt to total assets. All of these ratios are measures of the degree to which a firm or investor is relying on borrowed money to make its investments. See, e.g., TIM KOLLER ET AL., *VALUATION: MEASURING AND MANAGING THE VALUE OF COMPANIES* 180 (5th ed. 2010).

20. In Jeremy Stein’s model, banks create excess money and credit because they do not fully internalize the societal costs of the “fire sales” needed to pay off depositors when there is a run on bank deposits. Stein, *supra* note 1, at 14–15.

21. Tobias Adrian & Hyun Song Shin, *The Changing Nature of Financial Intermediation and the Financial Crisis of 2007-2009*, 2 ANN. REV. ECON. 603 (2010) (examining the relationship between excessive leverage and asset bubbles); John Geanakoplos, *Solving the Present Crisis and Managing the Leverage Cycle* (Yale Univ. Cowles Found. for Res. in Econ., Discussion Paper No. 1751, 2010) (linking leverage to the business cycle).

22. The Fed also tries to regulate inflation by setting key interest rates at levels designed to prevent the economy from growing too fast.

can create lots of substitutes for money (such as credit cards, money market mutual funds, home equity lines of credit and commercial paper), and these substitutes have not been as well regulated as are traditional banking activities. A rapid expansion in instruments that provide credit to the economy can have the same effect as a rapid expansion in the money supply—it stimulates economic growth and, sometimes, inflation. Moreover, the ability of the financial system to provide credit instruments dramatically increases as financial firms themselves rely heavily on debt or leverage. In this way, excessive leverage in the system as a whole increases the effective supply of money and credit. Repeated cycles of excess credit, in turn, have caused multiple rounds of inflation that have shown up not as general increases in prices, but as bubbles in the prices of various classes of assets.

Asset bubbles are a major problem because they have significant and pernicious effects on the allocation of capital and the distribution of wealth and income in the real economy. In particular, when excessive leverage drives up asset prices, financial-market participants who financed the investments in the assets, and others, may be more likely to forecast further price increases. These forecasts serve to justify supplying even more credit to investors in those asset classes, which further drives up prices in a self-fulfilling way. This flow of credit into the financing of certain asset classes helps fuel a pricing bubble. Participants in the process may be unaware that their actions, collectively, are having this effect—in fact, if they knew that the price increases they were observing were a bubble, presumably investors would be less willing to buy at inflated prices. However, it can be difficult for investors to identify a price bubble until it bursts.

Meanwhile, when prices of broad classes of assets go up generally, most investors have the experience of making money by buying and selling such assets, and they may believe that the traders and money managers who help them manage their investments are doing a good job. Those who buy the assets grow richer by investing in the assets as the bubble develops, and even those who sell off the underlying assets to the more optimistic investors get richer because they sell at inflated prices. Thus, inflation in asset prices creates the illusion that the financial sector is actually creating value for the economy as a whole as it invests in and trades those assets whose prices are being bid up. Investors then attribute the growth in their portfolio values to the skills of their money managers (or their own skills), and they are willing to pay them well for having

done so, even though, in reality, their portfolio values are rising because of leverage-driven asset inflation.²³

The standard story about the causes of the financial crisis emphasizes that financial institutions were investing in risky assets.²⁴ This is true in that it is always more risky to invest leveraged dollars than to invest unleveraged dollars, and many individual investors and financial institutions were operating with extraordinarily high leverage by the mid-2000s. But what was it that made the investments both so risky and so attractive? Why were so many investors willing to turn their savings over to money managers who were operating in this risky way? Are most investors not risk-averse?

Although investors are generally risk-averse, they nonetheless may want to use high levels of leverage in boom times because leverage can boost the returns even on mediocre investments. For this reason, investors were repeatedly willing to turn their assets over to financial institutions and investment managers who were operating with high levels of leverage. Moreover, investors allowed financiers and money managers to pay themselves substantial wages and bonuses for creating and trading risky securities that involved so much leverage because investors perceived themselves as sharing in the high returns. As a result, leverage in the system as a whole allowed the financial sector to take a growing share of national income in the form of wages, salaries, fees and bonuses, causing compensation per employee in the financial sector (including secretaries and clerks) to grow from \$35,000 per year in 1980 (in inflation-adjusted 2009 dollars) to approximately \$100,000 per year per employee since 2002²⁵—this is a fourth sense in which the financial sector has become too large.

In other words, by generating inflation in the asset classes they were financing, participants in the financial sector were able, for an extended period, to show gains on the portfolios they were managing. These gains appeared to more than offset the costs of their own compensation. Investors were more than happy to pay high fees, salaries, commis-

23. Greenwood & Scharfstein, *supra* note 1, at 3 (finding that a large share of the growth in the financial sector since 1980 relative to the economy as a whole “is a simple consequence of rising asset values without commensurate declines in percentage fees” charged by financial asset managers to manage portfolios).

24. The U.S. Financial Crisis Inquiry Commission found that the crisis was caused by, among other things, the fact that “[t]oo many of these . . . [financial firms] acted recklessly, taking on too much risk, with too little capital, and with too much dependence on short-term funding . . . [and] large investment banks and bank holding companies . . . focused their activities increasingly on risky trading activities that produced hefty profits.” FIN. CRISIS INQUIRY COMM’N, FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL ECONOMIC CRISIS IN THE UNITED STATES xviii–xix (2011).

25. Blair, *supra* note 1, at 282.

sions and bonuses to financial market actors who arrange financing for them on good terms or help them get into investments that appeared to be making money.

As long as the bubble doesn't burst, the illusion of value creation causes investors to accept higher leverage and to justify extraordinary compensation packages for the participants in the financial sector. In this way, bubbles tend to redistribute wealth and income to the people whose actions, collectively, cause the financial bubble. This redistribution is not necessarily reversed when the bubble bursts. The creators of the bubble, in fact, keep much of the wealth and income they capture during each cycle of bubbles, even after the bubbles burst.²⁶ In this way, cyclical instability in the financial markets acts as a one-way ratchet for financial sector compensation and a bubble-prone economy is an economy in which the distribution of income and wealth is likely to be widening.

How much distortion in the distribution of income and wealth has resulted from repeated cycles of bubble and burst in the financial markets? We do not have a wholly accurate way to measure bubbles, but consider what the allocation of GDP would have been in 2007, the last year before the recession, if the financial sector's share of GDP had stayed what it was in 1980. The National Income and Product Accounts (NIPA) show that, at its peak in 2007, the financial and insurance sectors accounted for 7.9% of GDP. This compares with 4.9% in 1980.²⁷ In other words, the financial sector captured three percentage points more of GDP—about \$412 billion worth—in 2007 than it had in 1980. This is equivalent to a transfer of about \$1,365 from every person in the U.S. in 2007 to the financial sector and to the people who work there.

Meanwhile, much of the value we thought the economy created in the mid-2000s turned out to be illusory—value that went away when the bubble burst. The Pew Financial Reform Project estimates that from September 2008 through the end of 2009, the U.S. GDP was \$648 billion lower as a result of the financial crisis than it otherwise would have been.²⁸ In addition, some \$3.4 trillion in apparent real estate wealth dis-

26. Hannah Shaw & Chad Stone, *Incomes at the Top Rebounded in the First Full Year of Recovery, New Analysis of Tax Data Shows: Top 1 Percent's Share of Income Starting to Rise Again*, CENTER ON BUDGET & POL'Y PRIORITIES, Mar. 7, 2012, <http://www.cbpp.org/cms/index.cfm?FA=VIEW&ID=3697>. Nelson Schwartz and Louise Story reported that the twenty-five highest-paid hedge fund managers earned a collective \$25.3 billion in 2009, "beating the old 2007 high by a wide margin." Nelson D. Schwartz & Louise Story, *Pay of Hedge Fund Managers Roared Back Last Year*, N.Y. TIMES, Mar. 31, 2010, at B1.

27. See Blair, *supra* note 1, at 281 fig.9.

28. Phillip Swagel, *Cost of the Financial Crisis: The Impact of the September 2008 Economic Collapse* 9 (Pew Econ. Pol'y Group, Fin. Reform Project, Briefing Paper No. 18, 2010), available at http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Economic_Mobility/Cost-of-the-Crisis-final.pdf.

appeared, and another \$7.4 trillion in apparent stock market wealth was also lost.²⁹

The Dodd-Frank Act³⁰ gives various regulatory bodies some of the authority and tools they need to begin actively regulating some parts of the shadow-banking system (where the worst leverage excesses occurred) that were previously outside their reach. But some of the most important parts of the shadow-banking system remain outside the regulatory ambit of banking authorities, and the agencies that regulate them may not be able to put effective constraints on leverage into place. Money market funds play a significant role in shadow banking by providing investors with an attractive alternative to bank deposits, for example, but they are not regulated by banking authorities. Instead, money market funds are regulated by the Securities Exchange Commission (SEC) because, technically, they are mutual funds. The SEC has considered regulations that would impose capital constraints on money market funds similar to those imposed on banks, but, faced with heavy pressure from the financial sector, the Commission could not reach agreement to impose such constraints.³¹

And even with respect to the regulation of leverage in banks, the Federal Reserve and the Federal Deposit Insurance Corporation (FDIC) coordinate with the Basel Committee on Banking Supervision, an international organization that coordinates bank regulations across the leading countries. The Basel Committee has put forward a set of principles that, if implemented, could begin to tighten controls on leverage.³² But there is a lot of flexibility in the Basel standards, so that their effectiveness at limiting leverage depends as much, or more, on how the standards are applied in practice as it does on what the standards are. To date, it remains unclear whether regulators will have the political will to set and enforce standards that are tough enough and comprehensive enough to get leverage under control.

29. *Id.* at 13–14.

30. Pub. L. No. 111–203, 124 Stat. 1376 (2010).

31. See Nathaniel Popper, *Changes to Money Market Funds Stall*, N.Y. TIMES, Aug. 22, 2012, <http://www.nytimes.com/2012/08/23/business/sec-calls-off-vote-on-fund-regulation.html>. As a result of the failure of the SEC to take action necessary to impose constraints on the money market fund industry, the Federal Reserve and the Treasury are looking for alternative ways to rein in this industry. See Zachary A. Goldfarb, *Treasury, Fed Looking at New Ways to Oversee Money Market Funds*, WASH. POST, Aug. 24, 2012, http://www.washingtonpost.com/business/economy/treasury-fed-looking-at-new-ways-to-oversee-money-market-funds/2012/08/24/2b02591a-ee2e-11e1-afd8-097e90f99d05_story.html.

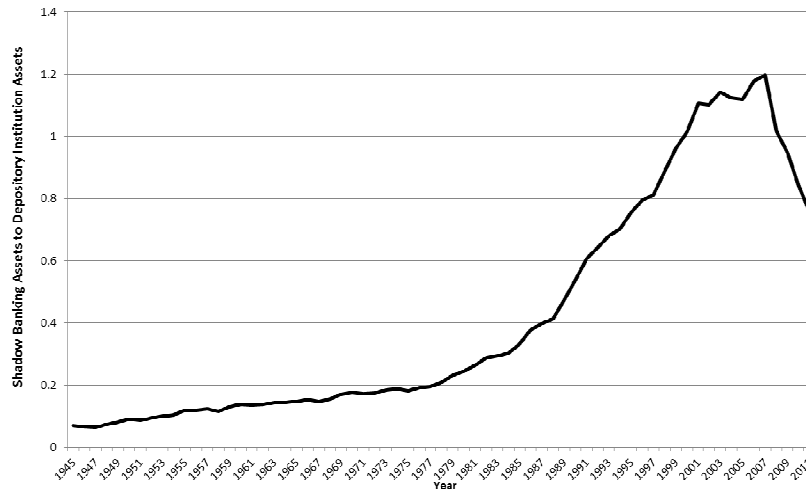
32. See Peter King & Heath Tarbert, *Basel III: An Overview*, 30 BANKING & FIN. SERVS. POL'Y REP. 1, 3 (2011).

III. SHADOW BANKING IN THE FINANCIAL SYSTEM

In the last few decades, several new categories of credit market institutions became important players in the financial markets, as these institutions engaged in asset securitization and other activities that allowed them to use short-term borrowing to finance long-term investment. These institutions came to be called the “shadow-banking system” because, collectively, they were carrying out functions that banks had traditionally carried out. Assets in this sector expanded rapidly, with assets under management rising from about 20% of the assets in the regulated banking sector in 1980 to about 120% by 2006 (before the financial market collapse, which caused the shadow-banking sector to shrink significantly).³³ Acknowledging their growing importance, the Federal Reserve began collecting aggregate data on the activities of these institutions. Figure 1 below shows how the shadow-banking sector compares with the regulated banking sector over time.

33. Blair, *supra* note 1, at 245. Adair Turner, Chairman of Great Britain’s Financial Services Administration, says that measures of the size of the “shadow-banking” sector depend on whether you believe “shadow banking” is a set of activities or a set of institutions, and on whether “we aggregate all values at all the links along the chain, or only at the end point connections to the non-financial real economy” and whether we measure “inter-institution links on a net or a gross basis.” Adair Turner, Lecture at Cass Business School: Shadow Banking and Financial Instability 7 (Mar. 14, 2012) (transcript available at <http://blogs.law.harvard.edu/corpgov/2012/04/16/shadow-banking-and-financial-instability>). For the analysis in this section, I measure the size of both the shadow-banking sector and the regulated banking sector by the dollar value of assets on the books of the institutions engaging in the respective activities. See Blair, *supra* note 1, at 245.

Figure 1: Ratio of Assets in Shadow-Banking Firms to Assets in Depository Institutions.³⁴



In a 2008 speech, Timothy Geithner, then President and CEO of the Federal Reserve Bank of New York, reported some indicators of the growth of the shadow-banking system:

In early 2007, asset-backed commercial paper conduits, in structured investment vehicles, in auction-rate preferred securities, tender option bonds and variable rate demand notes, had a combined asset size of roughly \$2.2 trillion. Assets financed overnight in triparty repo grew to \$2.5 trillion. Assets held in hedge funds grew to roughly \$1.8 trillion. The combined balance sheet of the then five major investment banks totaled \$4 trillion. In comparison, the total assets of the top five bank holding companies in the United States at that point were just over \$6 trillion, and total assets of the entire banking system were about \$10 trillion.³⁵

In 2009, Adrian and Shin did a calculation similar to those in Figure 1, and concluded that what they called market-based institutions had

34. Author's calculations based on Flow of Funds Accounts of the United States. BD. OF GOVERNORS OF THE FED. RESERVE SYS., FLOW OF FUNDS ACCOUNTS OF THE UNITED STATES: FLOWS AND OUTSTANDINGS THIRD QUARTER 2010 Z.1, 60 (2010). Shadow-banking assets are the sum of assets in government sponsored enterprises, agency- and GSE-based mortgage pools, ABS insurers, finance companies, and brokers and dealers. Depository institutions assets are the sum of assets in commercial banking, savings institutions, and credit unions. More details on file with author.

35. Timothy Geithner, President & Chief Exec. Officer of the Fed. Reserve Bank of New York, Speech at the Economic Club of New York: Reducing Risk in a Dynamic Financial System (June 9, 2008) (transcript available at <http://www.bis.org/review/r080612b.pdf>).

about 25% more in total assets than the regulated banking institutions did at the end of 2007.³⁶ Market-based institutions, as they use the term, means institutions that fund themselves by issuing securities (rather than by accepting deposits), and corresponds to the set of institutions included in the data for Figure 1. These institutions have, in the past, avoided many of the regulations that apply to banks. Specifically, two types of regulations that apply to banks (but not to shadow banks) are important: reserve requirements and capital requirements. Reserve requirements determine how much of the funds that are deposited in banks by bank customers may be loaned out or invested to earn a return. Capital requirements are more complicated in application, but essentially determine what share of total assets must be financed with equity capital rather than with debt capital.³⁷ Both types of regulation matter for the multiplier effect that banking activity has on the effective supply of money and credit in the economy.

A. Reserve Requirements and the Money Multiplier

When banks receive deposits of money from their customers, they are normally eager to invest the money by making loans or buying securities because the way that they make profits is to earn more on the loans and investments than they have to pay in the form of interest on the deposits. But they are not permitted to loan out all of the deposited money. Instead, they are required by law to put a certain percentage of those deposits aside as reserves in the form of cash in the vault or as deposits in reserve accounts with the Federal Reserve.³⁸ The rationale for this requirement is to make sure that the bank always has some cash available to pay out when their depositors write checks on their balances or want to make withdrawals. The amount that banks are required to keep as reserves is known as a reserve requirement. Since the reserve requirement is a fraction of total deposits, we have what is called a fractional-reserve banking system.

36. Adrian & Shin, *supra* note 9, at 1 fig.1 (describing the emergence and role of the shadow-banking system as part of the financial system).

37. The Federal Reserve sets capital requirements in a flexible way that specifies a target level of "capital" (meaning, essentially, equity capital) as a percentage of "risk-weighted" assets, which permits lower levels of capital for lower risk assets. This approach has been recommended in the past by the Basel Committee on Banking and Supervision and the Bank of International Settlements, organizations which establish international banking rules. See King & Tarbert, *supra* note 32, at 3.

38. The current required reserve ratio for large U.S. banks with more than \$71 million in deposits is 10% for deposits in excess of \$71 million, but less than that for the first \$71 million. See *Reserve Requirements*, BD. OF GOVERNORS OF THE FED. RES. SYS. (Oct. 26, 2012), <http://www.federalreserve.gov/monetarypolicy/reservereq.htm#table1>.

The reserve requirement can affect how much new money will be created by the banking system for every new dollar that the Fed injects into the economy. The Fed creates money in one of two ways—it creates currency by printing new bills and stamping out new coins and it increases the liquid funds available to the economy by purchasing Treasury securities from banks with cash.³⁹

Once a bank has received cash for some of its securities, the bank will have excess reserves and can then loan out a fraction of that new cash. However, the total money available to lend is not limited to the first bank's loan. In a fractional-reserve system, the banking system multiplies the amount of new money. Here is how this works:

Suppose that Bank *A* receives \$1,000,000 in new cash from the Federal Reserve. And suppose that the reserve requirement is 10%, meaning that the bank must hold at least \$100,000 of the new cash in reserve. But Bank *A* can loan out the rest, or \$900,000, which it does to Customer *A*.

Say that Customer *A* pays the \$900,000 to a builder who has built a new McMansion for *A*. The builder then deposits her \$900,000 into Bank *B*. Now Bank *B* has excess reserves and can loan out 90% of the new deposits, or \$810,000 to some Customer *B*. Customer *B*, in turn, spends the money, and those who receive the money deposit it into Bank *C*. Bank *C* thus receives \$810,000 of new deposits, of which it can now loan out 90%, or \$729,000. The customer who receives the \$729,000 again deposits it in some other bank, which can then loan out \$656,100, etc. When you repeat this process, the amount of money in circulation increases in a predictable way, as noted below:

Fed injection of cash into Bank <i>A</i> :	\$1,000,000
New deposit into Bank <i>B</i> :	900,000
New deposit into Bank <i>C</i> :	810,000
New deposit into Bank <i>D</i> :	729,000
Etc:	
<hr/>	
Total new deposits in banking system:	\$10,000,000

The total sum of this infinite series is \$1,000,000 divided by the reserve ratio, or in this case, $\$1,000,000/.1 = \$10,000,000$. In setting the

39. The Federal Reserve does not have to create actual currency in order to pay “cash” for the securities it purchases. Instead, it can increase the money that a bank has in its reserve account held by the Fed by simply making an accounting entry.

reserve requirement, the Federal Reserve can generally control the amount of what it calls M1 (cash plus checkable deposits plus travelers' checks) in the economy by controlling how much currency and reserves (currency plus bank reserves are the "monetary base") it injects into the system. In this simple example, \$1 million of new money in the monetary base results in \$10,000,000 of new M1. The ratio of new M1 created for every new dollar in the monetary base is called the money multiplier. In a fractional-reserve system with a 10% reserve requirement, in which the only way that money can be held in the private sector is in the form of checkable deposits, and in which banks always loan out as much money as they are entitled to loan out under the regulations, the money multiplier would be $\$10,000,000/\$1,000,000 = 10$.

In practice, the amount of money in the economy is multiplied by the action of banks as described above, but there are other factors at work so that the multiplier is less than 10. For example, many people hold money outside the banking system, in the form of currency (in cash registers in retail stores, for example). The multiplier can work only on the money deposited in banks. The money multiplier is also reduced if banks do not loan out or invest all of the money they would be entitled to loan out under the reserve requirement rules. In the wake of the financial crisis, many banks have been very wary about making new loans, so they have held on to new cash when they get it. This caused the money multiplier to collapse in late 2008, which has made it more complicated for the Federal Reserve to create enough new money to offset the sudden constriction of credit and liquidity in the system in 2008 and 2009.⁴⁰ But in normal times, the M1 money multiplier (the ratio of M1 to the monetary base) is greater than 1, meaning that for every dollar of currency and bank reserves that the Federal Reserve creates and injects into the banking system, banks create more than \$1 worth of checkable deposits so that M1 expands by more than the additional dollar.⁴¹

40. The M1 money multiplier has been less than 1 since late 2008, meaning that when the Federal Reserve adds a dollar of currency or reserves to the banking system, less than one dollar of new M1 is actually created. This is an example of a classic Keynesian "liquidity trap." The Federal Reserve Bank of St. Louis keeps track of monetary aggregates and regularly posts data on the M1 multiplier. See *M1 Money Multiplier (MULT)*, FED. RES. BANK OF ST. LOUIS (Feb. 14, 2013), <http://research.stlouisfed.org/fred2/series/MULT> (showing a chart in which the money multiplier is less than 1) (last visited Feb. 22, 2013).

41. Paul Krugman and Robin Wells state that the normal money multiplier is about 1.9, but in recent years, the multiplier has been trending downwards. PAUL KRUGMAN & ROBIN WELLS, *MACROECONOMICS* 395 (2d ed. 2009). An important reason for this downward trend is that a rising share of transactions taking place use such near-money instruments as money market funds and lines of credit so that the economy needs less in the way of cash and checkable deposits for a given level of economic activity.

Because the Federal Reserve directly controls only the monetary base, it has substantial influence over M1 through its control over the monetary base and its control over the reserve requirement. But M1 is no longer the only money in the economy. In practice, financial innovation has created new ways in which people and businesses can hold financial assets, or spend money, without actually handling currency or even writing checks on checkable deposits. For example, an individual may have a home equity line of credit, which enables her to borrow against the equity in her house, as needed. The homeowner could also make payments on the line of credit by setting up an automatic-payment arrangement with her bank, in which the bank takes assets out of the customer's savings or money market account at certain times each month. Businesses may have a line of credit with a bank or with a supplier, and the payables associated with that line of credit might even be settled from time to time by bank transfers from the business's accounts to those of the suppliers.⁴² Large corporations and financial institutions also have important alternatives to checkable deposits where they can either lend or borrow for very short terms. Businesses can issue and sell commercial paper, which are very short-term bonds, or raise money by selling securities together with a promise to repurchase the securities a few days or weeks later in the market for repurchase agreements, or repos. In many instances, especially in the case of individual consumers or small businesses, assets may have to flow through a bank checking account to pay off credit balances, but they may appear only very briefly as funds in a checkable account. Thus, to understand how liquidity is supplied by the financial system, we also need to understand these other mechanisms and how they influence economic activity.

In addition to M1, the Federal Reserve also tracks a broader measure of the money supply, called M2, which includes all of M1 plus time deposits, savings accounts, retail money market funds and bank certificates of deposits. Throughout the last half of the 20th century (until 2006), the Federal Reserve also tracked an even broader measure called M3, which included all of M2, plus large time deposits, institutional money market funds and repurchase agreements. M3 thus began to pick up some of the money creating activity in the shadow-banking sector, though not all of it. We could easily imagine an even broader measure that might include credit card accounts, lines of credit, or commercial paper. What becomes clear as we think about these broader categories of

42. Payroll deposit plans are an example of this.

what is sometimes called “near money” is that various forms of credit often serve as a substitute for money in the economy.⁴³

The significance of this is that, while the Federal Reserve has significant influence over the narrow measures of money in the economy, such as M1, the private sector now has much more control over the creation and use of near-money assets and other securities that act like money in the economy. The Federal Reserve, which is the governmental body that is supposed to control the flow of money and credit in the economy in order to promote economic activity while keeping inflation under control,⁴⁴ actually has much less influence over the supply of money and credit than it has had historically, except through its influence on interest rates. A substantial part of money creation is now in the hands of the private sector.

B. Leverage and the Supply of Credit

In the last few decades, and especially since about 1980, financial innovation has created numerous alternative ways that investors can invest surplus funds and numerous ways that individuals and businesses can get credit that can almost completely bypass the banking system.⁴⁵ In this way, the supply of credit from outside the banking system has grown much faster than the supply of money and credit made available by banks. This is clear from data reported in Figure 1, which shows that the ratio of shadow-banking assets to banking assets was very small in the 1940s and early 1950s, but by the mid-1990s, it exceeded 1, and it stayed above 1 until the widespread collapse of banks and nonbank financial institutions in 2008 and 2009.⁴⁶ Nearly five years after the financial market collapse began, practically as much total credit is available to the U.S. economy through nonbank institutions such as finance companies, government-sponsored entities (such as Fannie Mae and Freddie Mac), mortgage pools, asset-backed securities issuers, and brokers and dealers, as is available through banks.

43. Ricks refers to all credit instruments with a maturity date of one year or less as “money claims.” See generally Ricks, *supra* note 1.

44. The Federal Reserve Act of 1913 calls for the Federal Reserve to pursue three objectives, high employment, stable prices, and moderate long-term interest rates. 12 U.S.C. § 225a (2000).

45. One of the most familiar examples of this financial innovation is the development of money market funds in the 1970s and 1980s. See Blair, *supra* note 1, at 235–39.

46. Recall that the assets of a bank or other financial institution consist almost entirely of its financial investments, such as its portfolio of loans or securities, which are a source of credit for the “real” economy, where goods and services are created and exchanged. Thus, the total assets of banks, or other financial firms, are a measure of the amount of credit financial firms are supplying to the economy.

Although the total amount of money that banks can create (in the form of additional checkable deposits) is constrained by the reserve requirement that banks face, the total amount of credit (including near money instruments) that banks and other financial institutions can create is constrained ultimately not by the required reserve ratio, but by the ability of these institutions to raise funds from sources other than bank deposits—by borrowing, selling debt securities, or selling stock. With these other sources of finance capital, a key factor limiting aggregate credit is the degree to which the institutions may be leveraged.

Leverage is a measure of the degree to which an institution relies on debt rather than equity for financing. Sometimes it is measured in terms of the ratio of total debt to total assets of the borrowing firm and sometimes as the ratio of total assets to equity.⁴⁷ In the banking sector, banks not only face reserve requirements, but they also face what are called capital requirements.⁴⁸ Capital requirements, to oversimplify, determine the amount by which a bank's total assets (cash plus loans or other investments) must exceed its liabilities (deposits, plus any borrowing in credit markets).⁴⁹ Capital requirements determine how much of a financial cushion, over and above its liabilities, a bank must have, or, conversely, how leveraged it can be. In the U.S., bank regulators have the authority to require banks to satisfy capital requirements in addition to reserve requirements, but capital requirements have varied and have been applied in complex ways over the years.⁵⁰

Since 1974, through the Bank of International Settlements and the Basel Committee on Bank Supervision, the U.S. has participated in in-

47. A common convention in the financial sector is to measure leverage as the ratio of total assets to equity. As the share of equity for a given institution or transaction gets smaller and smaller and approaches zero (as it did in many institutions in the years leading to the crisis), this measure blows up. For this reason, I report leverage levels in this Article in terms of the ratio of debt to total assets.

48. Outside of the regulated banking sector, capital levels have not historically been regulated, although prior to the financial crisis, most economists believed that the market would impose constraints by refusing to lend to institutions that were already too highly leveraged.

49. "Capital" is a term of art in the bank regulatory world, and capital requirements are very complex. DOUGLAS J. ELLIOTT, *A PRIMER ON BANK CAPITAL* 1–2 (2010). This complexity stems from the fact that, for regulatory purposes, some kinds of long-term debt, as well as equity, may count as "capital." In addition, banks may also raise funds by issuing hybrid securities such as "preferred shares," which will count as capital. Furthermore, capital requirements are applied only to assets that are considered risky. If a bank holds U.S. Treasury securities, for example, those are considered to be riskless and liquid, so banks are not required to hold any capital to support such assets. Thus, in the regulatory world, capital requirements are stated in terms of the ratio of "regulatory capital" to "risk-weighted assets."

50. *Id.* at 8–11. A key distinction between reserve requirements and capital requirements is that reserve requirements are designed to ensure that a bank maintains enough of its assets in highly liquid forms so that it can pay out money to depositors on demand. The capital requirement is intended to ensure that the bank stays solvent—that the value of its assets always exceeds its liabilities.

ternational efforts to coordinate capital requirements across countries. Under the “Basel I” agreement, reached in 1988, internationally active banks in the G10 countries were supposed to hold minimum capital levels determined by a rather complex formula. In essence, the requirement called for banks to hold capital equal to up to 8% of risk-weighted assets, with less capital required for less risky assets.⁵¹ Capital requirements under Basel I never had the force of law in the U.S., but bank regulators in the U.S. have used the various Basel agreements as guidelines for regulating bank capital.

A subsequent international agreement was negotiated in the late 1990s and early 2000s. The new agreement, “Basel II,” announced in 2004, created a more complex system for determining the risk weights on assets, as well as for the classification of assets as capital. It allowed the largest banks to use their own internal models to determine the risk classification of many assets, and it relied more on supervisory review as well as the hope that markets would provide some discipline to rein in the amount of leverage a bank uses. Although early drafts of the agreement proposed new rules that would have had the effect of increasing capital requirements, under the agreement ultimately reached, many banks were able to *reduce* the total amount of capital they held.⁵² The U.S. never fully implemented Basel II, but in practice, banking regulators often permitted banks to have significantly less than 8% of their assets in equity capital. The Basel Agreement has undergone substantial revision in the wake of the financial crisis, and it should play a significant role in how regulators approach the problem of regulating leverage in the financial sector in the months and years ahead.⁵³ The “Basel III” requirements are supposed to be phased in over a number of years, however, and may not be fully effective until 2019.⁵⁴

51. The Basel Committee on Banking Supervision called for a target standard ratio of capital to risk-weighted assets of 8%. Basel I called for capital requirements to be determined on an asset-by-asset basis, depending on the riskiness of the asset, which were measured on the basis of complex formulas. Assets such as government securities were considered risk-free and, therefore, required no capital. See DANIEL K. TARULLO, *BANKING ON BASEL: THE FUTURE OF INTERNATIONAL FINANCIAL REGULATION* 55–59 (2008).

52. *Id.* at 112–13, 148–49.

53. See *Hearing Before the H. Comm. on Financial Services*, 112th Cong. 12 (2011) (written testimony of Hal S. Scott, Director, Committee on Capital Markets Regulation) (stating that “Basel III, when fully implemented by 2019, will require banks to hold 4.5% of common equity and 6% of Tier I capital (up from 4%) against risk-weighted assets (RWAs)”). Basel III also introduces additional capital buffers, a mandatory capital conservation buffer of 2.5% and a discretionary countercyclical buffer, which allows national regulators to require up to another 2.5% of capital during periods of high credit growth. In addition, Basel III introduces a minimum 3% leverage ratio and two required liquidity ratios.

54. BASEL COMM. ON BANKING SUPERVISION, *BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS* 27–28 (2011).

In the years leading up to the financial crisis, banks and other financial institutions raised a growing amount of funds for lending by borrowing in the credit markets—such as by issuing commercial paper, selling asset-backed securities, or entering into repurchase agreements. These approaches to raising funds increased the degree of leverage the financial institutions were employing. For financial institutions, leverage is often the key to profitability. To understand this, consider a home-buyer who gets a 90% mortgage to buy a \$100,000 house. With a large mortgage like that, the home-buyer only has to have \$10,000 in cash to buy the house. Moreover, if the house goes up in value by 5%, from \$100,000 to \$105,000 during the first year after the buyer moves in, he will have \$15,000 in equity in the house at the end of the year—a 50% return on the initial \$10,000 investment. Of course, if the house declines in value by only 5%, the equity in the house falls by 50%, from \$10,000 to \$5,000. A mere 10% decline in the value of the house would completely wipe out the homeowner's equity in his house.

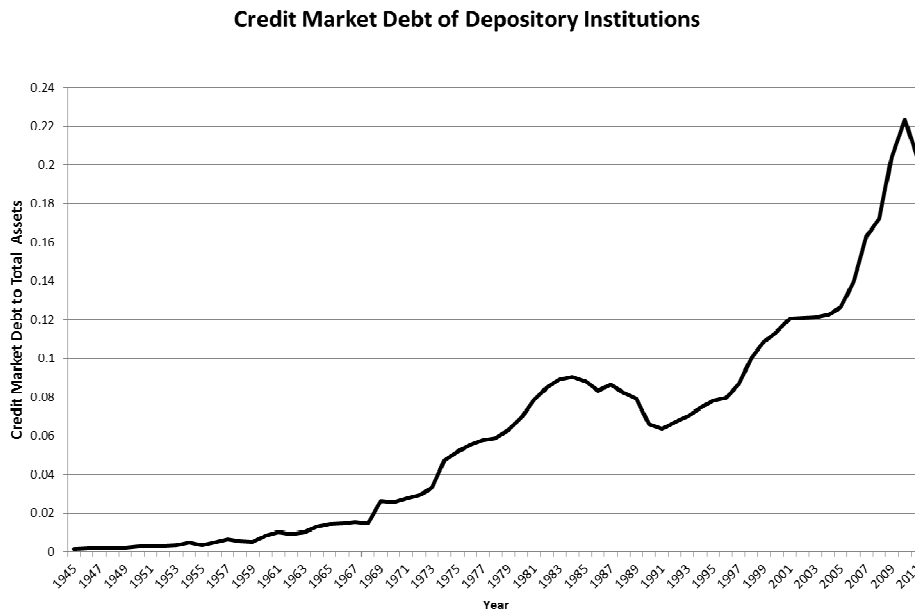
More generally, if investors think the underlying assets are likely to rise in value, they will see it as highly profitable to use as much leverage as the markets will allow them to use, so that they can invest as much as possible in those assets.⁵⁵ Beyond that rationale, leverage has become important in the financial sector because competitive pressures from various kinds of nonbank institutions that offer bank-like services, as well as from international banks, have helped to keep margins low on many bank services. Thus, to improve their returns on capital (and, not incidentally, to increase the compensation of bankers and other managers and employees of financial institutions), banks attempt to increase the amount of assets they manage and services they provide for any given level of regulatory capital. If a financial institution can borrow enough in the credit markets, it can greatly increase its total assets, which can drive up its expected return on equity. In good years, when the value of the institution's investments rises, its shareholders earn high returns. In fact, even a very small return on total assets for the institution as a whole can still provide a high return on equity if the institution is sufficiently leveraged. In bad years, shareholders in highly leveraged financial firms may take a big hit, and could even be wiped out. But the downside risk for shareholders is limited because they are protected by limited liability, which has the effect of pushing risk off to creditors. Moreover, if shareholders are diver-

55. Arthur E. Wilmarth, Jr., *The Dark Side of Universal Banking: Financial Conglomerates and the Origins of the Subprime Financial Crisis*, 41 CONN. L. REV. 963, 1009 (2009) (estimating that household mortgage debt nearly quadrupled, from \$2.7 trillion in 1991 to \$10.5 trillion in 2007).

sified and if failures of financial institutions are random,⁵⁶ on average, investors will earn more if the institutions are highly leveraged.

For this reason, banks have financed a growing share of their total assets by borrowing in the credit markets. Other types of financial institutions have also ratcheted up their borrowing. Figure 2 below measures the aggregate ratio of credit market debt to total assets of banks, savings institutions and credit unions (all depository institutions). This ratio has climbed from less than .02 (2%) prior to the 1960s (when banks relied almost entirely on deposits), to more than .20 (20%) by the late 2000s.

Figure 2: Reliance of Banks and Other Depository Institutions on Credit Market Financing⁵⁷



56. This is a big “if.” The principle behind the idea of reducing risk through diversification requires that returns on the various investments in a portfolio are not correlated with each other. It turned out that investments in housing, while distributed across geographic markets, price ranges, and credit risks, were still highly correlated with each other so that diversification within the category of housing investments did not eliminate or even substantially reduce default risk. Joshua Coval, Jakub Jurek & Erik Stafford, *The Economics of Structured Finance*, 23 J. ECON. PERSP. 3, 15–17 (2009).

57. Author’s calculations based on Flow of Funds Accounts of the United States. BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 34, at 60. Credit market debt owed by the depository institutions sector divided by total assets held by these institutions. More details on file with author.

Figure 3 plots the aggregate total leverage (total liabilities divided by total assets) of U.S. depository institutions,⁵⁸ compared with the aggregate leverage of financial firms in the shadow-banking sector (government sponsored enterprises, agency- and GSE-backed mortgage pools, ABS issuers, finance companies, and brokers and dealers).⁵⁹ In Figure 3, we see that the aggregate leverage of depository institutions has actually declined from what it was during the late 1970s and early 1980s and is now somewhat below .9 (90%).⁶⁰ But while the aggregate leverage ratio for the banking sector has declined, as measured by Flow of Funds data, this does not give the full picture. An important reason why banks and other depository institutions have been able to reduce their leverage ratios (or increase their capital ratios) is that they have developed ways to get assets and associated liabilities off the balance sheets of the regulated parts of their operations. Many of these assets are now being financed by securities issued by “special purpose entities” (SPEs), also called “special purpose vehicles” (SPVs), or “structured investment vehicles” (SIVs), or sometimes conduits, created by banks, finance companies, investment banks, government-sponsored entities, and brokers and dealers for the sole purpose of holding the assets and issuing the special securities.⁶¹

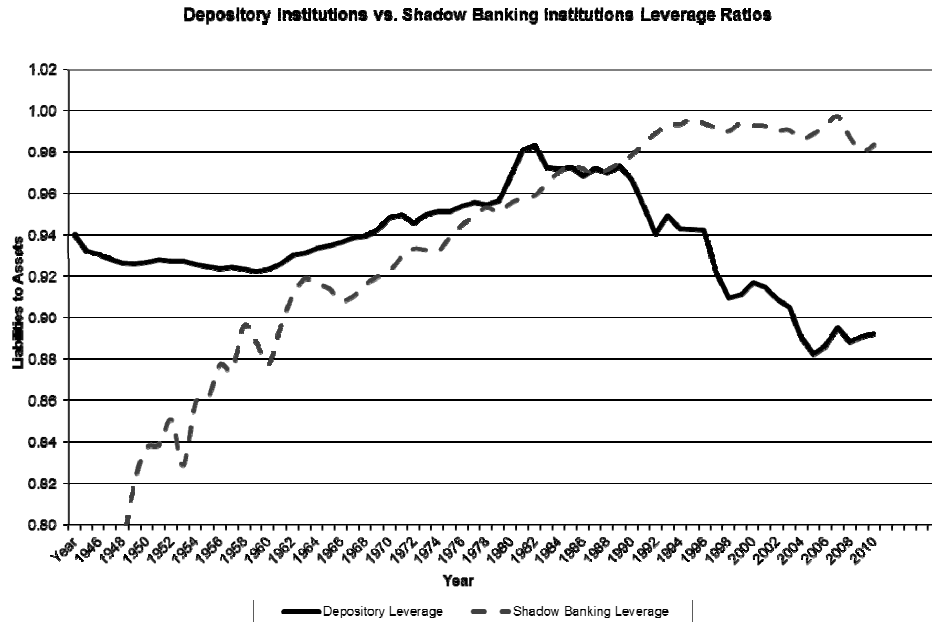
58. Depository institutions include banks, savings and loan associations, savings banks, and credit unions.

59. For purposes of this analysis, I measured aggregate leverage in the various parts of the financial system using data from the Federal Reserve for assets and liabilities in the financial sector. I make no attempt to report the more complex measure of regulatory capital as a share of risk-weighted assets that bank regulators would focus on.

60. The aggregate amount of leverage of depository institutions in the U.S. hit very high levels in the 1980s because depositors sought to move large amounts of savings out of banks and thrifts and into money market mutual funds, which were a new category of investment vehicle, and which paid higher rates of interest. Meanwhile, depository institutions, especially savings and loans, could not liquidate assets, which included mortgages and other long term loans, fast enough to offset the decline in deposits. Many savings and loans and a number of banks failed during this period. Leverage in the depository institution sector was brought down after 1988, at least partly in response to Basel I. TARULLO, *supra* note 51, at 55–59.

61. Viral V. Acharya & Philipp Schnabl, *How Banks Played the Leverage “Game,”* in RESTORING FINANCIAL STABILITY: HOW TO REPAIR A FAILED SYSTEM 83, 89 (Viral V. Acharya & Matthew Richardson eds., 2009) (“The economic rationale for setting up conduits has always been to reduce capital requirements imposed by bank regulation.”). Similarly, Jeremy Stein observes that “[i]t has become apparent in recent years that another important driver of securitization activity is regulatory arbitrage, a purposeful attempt by banks to avoid the rules that dictate how much capital they are required to hold.” Jeremy C. Stein, *Securitization, Shadow Banking & Financial Fragility*, 139 DAEDALUS 4, 45 (2010).

Figure 3: Leverage Ratios of Banking (Depository Institutions), and Shadow-Banking Sectors⁶²



Asset-backed securities, derivatives, and special purpose entities enabled banks and other financial institutions to create what Michael Simkovic calls “hidden leverage.”⁶³ Hidden leverage techniques were considered advantageous for these institutions because they made it possible for the institutions to borrow at more attractive rates by hiding their existing debts, thereby creating an exaggerated appearance of creditworthiness. Simkovic reports that securitization can sometimes reduce interest rates by 150 basis points compared with a similar secured loan.⁶⁴

The Federal Reserve Flow of Funds data accounts for some of this kind of financing through two new subsectors of the financial sector labeled Mortgage pools and ABS issuers. Mortgage pools are a category that are really more like an accounting entry in the Flow of Funds data in that they have an aggregate leverage ratio of 1 by construction. ABS issuers are separate legal entities, such as the special purpose entities men-

62. Author’s calculations based on Flow of Funds Accounts of the United States. BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 34, at 71, 75, 76, 80, 81, 83. More details on file with the author.

63. See Michael Simkovic, *Secret Liens and the Financial Crisis of 2008*, 83 AM. BANKR. L.J. 253, 253–56 (2009).

64. *Id.* at 264.

tioned above. They have an aggregate leverage ratio of 1 or somewhat higher than 1. While ABS issuers and other special purpose entities are legally separate from their sponsoring institutions that create them and sell their securities, during the financial crisis, the big banks or investment banks generally stood behind the securities issued by the entities. Possibly for reputational reasons, when such entities began failing during the financial crisis, the big banks often took them back onto their balance sheets.⁶⁵

When we aggregate the liabilities and assets of the five sectors that are key players in the shadow-banking system (reported in Figure 3), and take the ratio to get a sense of the aggregate amount of leverage in the shadow-banking part of the financial system, we see that it is close to 1 and has been since the mid-1990s. Thus, with a growing share of financial assets financed by highly leveraged shadow-banking institutions in the years leading to the financial crisis, the effective leverage in the system as a whole rose to about .94, or 94% by the time the financial crisis began to unfold. This is equivalent to a capital ratio of only 6% for the combined system in the U.S. (the banking system plus the shadow-banking system).⁶⁶ This is substantially lower than the 8% capital ratio recommended under Basel I.⁶⁷

IV. THE MACROECONOMICS OF SHADOW BANKING: WHY LEVERAGE MATTERS

The aggregate amount of leverage in the financial system as a whole has not previously been a factor that regulators and macroeconomic policy makers have paid much attention to;⁶⁸ although, as noted before, regulators at both the national and international level have tried to establish international capital standards for banks. Leverage matters at

65. "What is striking about these shadow-banking vehicles is that many of them operated with strong guarantees from their sponsoring banks. Indeed, when the SIVs and conduits got into trouble, the banks honored their guarantees, stepping up and absorbing the losses." Stein, *supra* note 61, at 45; see also Acharya & Schnabl, *supra* note 61, at 92 (claiming that "the vast majority of assets in SIVs were taken back on bank balance sheets").

66. As I am using these ratios here, the capital ratio plus the leverage ratio equals 1 or 100%, by construction. See BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 34, at 64.

67. This may also understate the amount of leverage that major banks and investment banks were using, to the extent that financial firms did not consolidate the debt of their SIVs, or to the extent that "repo" transactions enabled banks to temporarily sell assets and add cash for the last few days of each reporting period. In the spring of 2010, investigators at the Federal Reserve Bank of New York found that at least eighteen major banks were engaging in this practice during 2009. Kate Kelly, Tom McGinty & Dan Fitzpatrick, *Big Banks Mask Risk Levels*, WALL ST. J. (Apr. 9, 2010), <http://online.wsj.com/article/SB10001424052702304830104575172280848939898.html>.

68. The emphasis on capital ratios through the Basel process has primarily been out of concern for the safety and soundness of individual financial institutions, especially systemically important institutions, rather than for the stability of the financial system as a whole.

the level of individual financial institutions because it magnifies both percentage gains relative to equity and percentage losses relative to equity in the institution. Leverage also affects the probability that an institution will be able to repay all of its creditors. Thus, investments made in or by highly leveraged institutions are inherently more risky than the same investments would be if they were made to or by an institution with a much higher share of equity capital.

Leverage also matters for systemic reasons. Leverage adds riskiness to the economy as a whole because it magnifies spillover effects; if one institution comes up short in its ability to repay one loan, then very likely it will also be unable to repay other loans that it has taken out. Moreover, if Bank *A* cannot repay the money it owes to Bank *B*, this may mean that Bank *B* will be unable to repay some of its loans if Bank *B* was also highly leveraged. This in turn may increase the probability that Bank *C* or *D* will be unable to repay their loans if they have loaned money to Bank *B*. Thus, in a financial system in which most of the participants are highly leveraged and highly interconnected through the short-term credit markets, a bad loan is highly contagious. Problems with liquidity or solvency at one set of borrowers can spill over to other lenders and their customers. For this reason, the degree of leverage of any given institution is not truly a private matter between the institution and its investors, because there may be social costs that fall on outsiders when an institution is over-leveraged.

Leverage also adds risk to the economy because of the “credit multiplier” effect of leverage. To make this clear, imagine that we have a financial institution—a bank—that has a 25% capital requirement.⁶⁹ And suppose this bank has \$25 in equity capital and \$75 worth of deposits. To keep the math simple, and so that we can focus on the effect of the capital ratio, we will also ignore the effect of any reserve requirement our bank may face. This gives it a balance sheet that looks like Panel A of Figure 4 below, in which \$25 of equity plus \$75 of liabilities (such as deposits) finances \$100 of total assets. If the capital requirement for this bank is now reduced to 10%, the bank can substantially grow its balance sheet. Its \$25 in equity can now be paired with \$225 in liabilities, to support \$250 in total assets. In this way, “capital” in a financial institution can finance total assets worth $1/(\text{capital requirement})$ times capital. With a 10% capital requirement, banks can finance assets worth $1/.1 = 10$ times the dollar amount of capital in the banks. If financial institutions

69. For purposes of this analysis, I am using the concept of capital requirements in a very simplistic way to mean, essentially, the ratio of equity to total assets.

are allowed to operate with only 5% of capital (or less), those institutions can finance 20 times that amount of total assets.

Figure 4: The “Credit Multiplier”

Panel A Balance Sheet 25% Capital Requirement		Panel B Balance Sheet 10% Capital Requirement	
Assets	Equity	Assets	Equity
\$100	\$25	\$250	\$25
	Liabilities		Liabilities
	\$75		\$225

If the capital requirement declines for all the banks in an economy at the same time, so that they are all trying to increase the assets on their balance sheets, you might ask where they will all be able to get the additional loans that can enable the banks to acquire the additional assets and expand their balance sheets. In fact, you should also ask where the additional assets will come from. If a financial system with a 10% capital requirement suddenly becomes a financial system with only a 5% capital requirement, the balance sheets of the system could double in size, but where would the additional debt capital and assets come from to allow the whole system to expand its balance sheets by that much?

One answer to that question is that financial institutions would happily lend money to each other because a loan to Bank *A* by Bank *B* is an asset on Bank *B*'s balance sheet; and Bank *B* also wants to expand, so it is happy to borrow money from Bank *C* to loan to Bank *A*, etc. Of course, one may think that the banks in the aggregate should not all be able to make money if all they are doing is borrowing from and lending to each other.⁷⁰ So, in addition to simply buying each other's securities,

70. Although it may sound crazy, in the years leading up to the financial crisis, there is good reason to believe that a substantial part of the rapid expansion of balance sheets in the financial sector was the result of institutions essentially borrowing and lending to each other. Adrian & Shin, *supra* note 21, at 616 (observing, for example, that “expanding assets [of financial institutions] means finding new borrowers,” and that securitization allowed “banks and other intermediaries to leverage up by buying each other's securities.”). During a speech in the fall of 2011, Adair Turner observed that the “dramatic increase in the scale of financial system assets as a percent of GDP . . . [is explained] by a huge explosion of claims between financial institutions, i.e. intrafinancial system claims.” Turner, *supra* note 3. To be sure, institutions trading a certain amount

the financial institutions in which the capital requirement declines will probably also try to provide as much new financing to the real side of the economy as they can. This new financing could be used to create new assets (such as to build new houses or start new businesses). Thus, a lower capital requirement in the system as a whole would probably lead to some expansion in the real economy.⁷¹ A lower capital requirement is thus expansionary in the same way, and for the same reasons, that an increase in the money supply is expansionary.⁷²

But if credit expands in the financial sector faster than the real economy creates new real assets in response, some of the expansion of credit might be used by investors in the real economy to bid up the prices of existing assets. A very rapid expansion of bank credit, especially one in which the growth of credit is concentrated in certain sectors of the economy, might even cause serious inflation in some categories of assets—in other words, a rapid expansion of credit might cause asset bubbles.

Thus, we see that the capital requirement in a financial system (or its inverse, the degree of leverage allowed in the system) works in a way that is analogous to the reserve requirement in the banking system. A fractional reserve requirement permits the banking system to create cash and checkable deposits (M1) that are a multiple of the amount of any new cash and reserves that the Federal Reserve injects into the banking system; and in a similar way, a fractional capital requirement permits a

of assets and liabilities with each other can create value. In this simplified model, for example, we have not introduced any of the messy realities of a real economy, in which some assets are riskier than others, and some loans are for a short term while others are for longer term.

71. Tobias Adrian and Hyun Song Shin suggest that leverage is the “forcing variable” in financial firms (rather than the passive outcome of investment decisions), and that financial firms expand or contract their balance sheets to achieve the preferred leverage level. Adrian & Shin, *supra* note 21, at 608. Adair Turner describes this process, which he calls “self-reinforcing credit creation in the upswing” as follows: “Credit suppliers enjoy low loan losses, which swell profits and capital bases, providing revenues for still further credit expansion, and which reassure them in their conviction that lending against assets is relatively low risk” and “borrowers caught in a cycle of irrational exuberance, assume that asset prices will increase further and borrow more in pursuit of capital gain.” Turner, *supra* note 3.

72. The theory I am articulating about the role of leverage in economic expansion is similar to a theoretical approach referred to by macroeconomists as the “bank-lending channel.” As Ben S. Bernanke, Chairman of the Federal Reserve System, explained in a speech at the Credit Channel of Monetary Policy in the Twenty-First Century Conference, “The theory of the bank-lending channel holds that monetary policy works in part by affecting the supply of loans offered.” Ben S. Bernanke, Chairman, Fed. Res. Sys., Speech at the Credit Channel of Monetary Policy in the Twenty-First Century Conference: The Financial Accelerator and the Credit Channel (June 15, 2007) (transcript available at <http://www.federalreserve.gov/newsevents/speech/bernanke20070615a.htm>). “By affecting banks’ loanable funds, monetary policy could influence the supply of intermediated credit.” *Id.* Among contemporary macroeconomists, efforts by the Federal Reserve to expand money and credit in the economy as a whole are referred to as “quantitative easing.”

financial system to create total credit in the system that is a multiple of the amount of equity capital supplied by investors.

Moreover, just as a rapid expansion of money (whether we consider M1 or M2 or some other measure of money) in the economy can cause generalized inflation, if a financial system rapidly expands the amount of credit it is supplying to the economy, this could also cause inflation (or a bubble), especially in the asset classes that are being financed by the new credit.

It should not be too surprising that credit can be multiplied in an economy in a way analogous to the way money is multiplied and that a credit expansion can have effects that are very similar to a monetary expansion. But banking and financial market regulators have only recently begun to look at the ability of the shadow-banking system to expand the availability of credit, and the corresponding expansion of very short-term near-money securities, and regard it as a form of money creation.⁷³ Adair Turner, Chairman of the United Kingdom's Financial Services Administration, concludes, "Essentially therefore, the shadow banking system can create forms of 'private money' held either by the non-financial real economy or by intermediate financial institutions, in a fashion analogous to the banking system's own creation of deposit money."⁷⁴

As we have seen in the discussion above about substitutes for money in a modern economy, and various ways that the Federal Reserve measures the money supply, and the various components of the money supply, there is no bright line that separates traditional money from other forms of credit. What monetary authorities call M1 is just the most liquid, most immediately spendable types of assets: cash, checkable bank deposits, and travelers' checks. M2 includes all of this plus other categories that are almost as liquid, including funds in savings accounts, and retail money market mutual funds. The next broader aggregate, what was called M3 when the Federal Reserve still measured it, included all of M2, plus large time deposits, institutional money market mutual funds, and repurchase agreements. In other words, M3 included several categories of assets that are highly liquid but not immediately spendable, some of which are created in the shadow-banking system, where limits on leverage have been much looser, rather than in the banking system.

The idea that money is credit and that credit—especially very short-term sources of credit—is a form of money has been neglected in recent years by scholars and policymakers in the fields of finance and macroe-

73. See Turner, *supra* note 3 (noting that macroeconomics has largely failed to incorporate a detailed understanding of credit creation and credit allocation); see also Blair, *supra* note 1; Ricks, *supra* note 1; Stein, *supra* note 1.

74. Turner, *supra* note 33, at 21.

conomics.⁷⁵ One indication that this idea has been neglected is the very fact that the Federal Reserve, which is responsible for regulating banking and has a goal of encouraging full employment and preventing inflation, stopped measuring M3 in early 2006. When it announced that it would no longer collect and report the data necessary to measure M3, the Federal Reserve issued a Statistical Release explaining that “M3 does not appear to convey any additional information about economic activity that is not already embodied in M2 and has not played a role in the monetary policy process for many years.”⁷⁶ Yet M3 might have provided an important window on what was going on in the markets for very short-term credit in the months and years leading up to the crisis, especially in the market for “repos,” which froze up almost completely in the fall of 2008.⁷⁷

Although we do not have official Federal Reserve data tracking M3, we do have data from the Federal Reserve and other sources that track assets in key components of the shadow-banking system. Figure 5 below tracks the growth of assets in the shadow-banking sector since the late 1960s and illustrates how this sector grew explosively from the late 1990s until 2007. When the crisis hit, all of the components of the shadow-banking sector tracked here started shrinking as individual firms in the sector tried to deleverage, with the exception of the Government-Sponsored Entities (GSEs), which includes prominently Fannie Mae (Federal National Mortgage Association or FNMA), and Freddie Mac (Federal Home Loan Mortgage Corporation). As part of the broad bailout

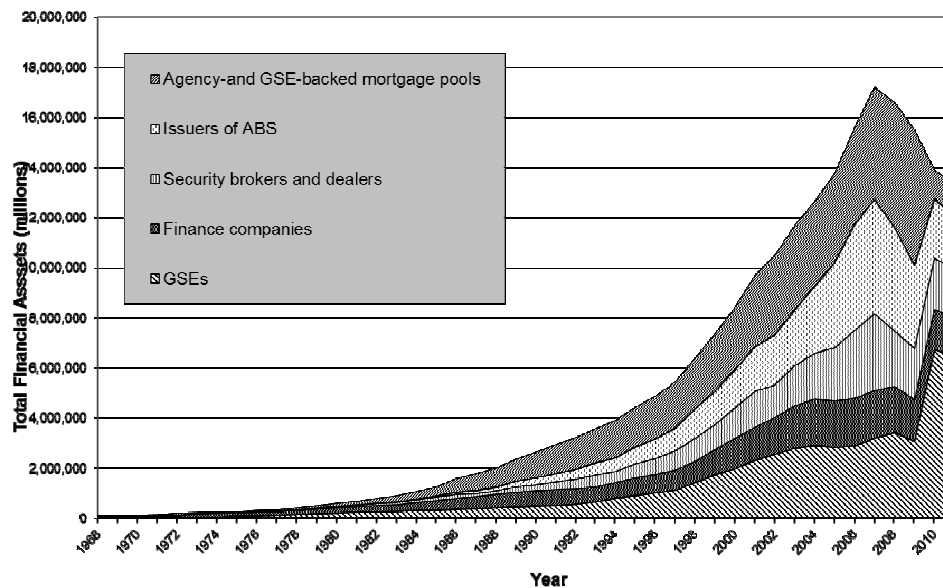
75. Adrian & Shin, *supra* note 21, at 615 (“Prior to 1980, the monetary policy literature primarily focused on the role of monetary aggregates in the supply of credit. However, with the emergence of the market-based financial system, the ratio of high-powered money to total credit (the money multiplier) became highly unstable. As a consequence, monetary aggregates faded from both the policy debate and the monetary policy literature. However, there is a sense in which the focus on balance-sheet quantities is appropriate. The mechanisms that have amplified fluctuations in capital market conditions are the fluctuations in leverage and the associated changes in haircuts in collateralized credit markets.”). A “haircut” is the term of art for the percentage discount that an asset seller will have to give the asset buyer on the front end of a “repo” transaction. It is a measure of leverage.

76. *H.6: Money Stock Measures*, BD. OF GOVERNORS OF THE FED. RES. SYS. (Nov. 10, 2006), <http://www.federalreserve.gov/releases/h6/discm3.htm>.

77. Gary Gorton similarly speculates that if the Federal Reserve had continued to monitor M3, it might have anticipated the bubble and responded earlier. “The repos included in the old money measure of M3 were narrowly those done only by the limited number of primary dealers that are approved to do business with the Fed. The [whole] repo market . . . was much broader and was not included in M3 or indeed measured at all. If this broader repo market had been included, presumably M3 would have been on a steep upward trajectory that would have been noticed and questioned. But this did not happen. Instead, about a year and a half after the calculation and publication of M3 ceased, the panic of 2007 erupted in the much broader repo market. In other words, the shadow banking system was so far off the radar screen that instead of increasing the coverage of the repo counted for M3, the calculation was discontinued.” GORTON, *supra* note 1, at 176.

effort to prevent the financial system from complete collapse, these entities have bought up a substantial amount of mortgage assets from banks and shadow banks since the crisis. Nonetheless, despite the expansion of the GSEs, the shadow-banking sector as a whole declined from \$17.2 trillion in assets at the peak in 2007 to \$13.3 trillion at the end of 2011.⁷⁸ As the shadow-banking sector shrinks, it has contributed to the slow-down of the aggregate economy, just as we might expect from decline of the aggregate money supply.⁷⁹

Figure 5: Assets in Shadow-Banking Sector⁸⁰



Morgan Ricks has assembled data tracking the growth over time in what he calls money-claims, which are all securities that have a maturity date of one year or less. These data reveal what Federal Reserve data might have revealed if the Fed had continued to measure M3, and, rather than discontinuing the measure, had expanded data coverage to include what might be called M4, or M5, or higher levels of monetary aggregates. Ricks' data are illustrated in Figure 6 below.

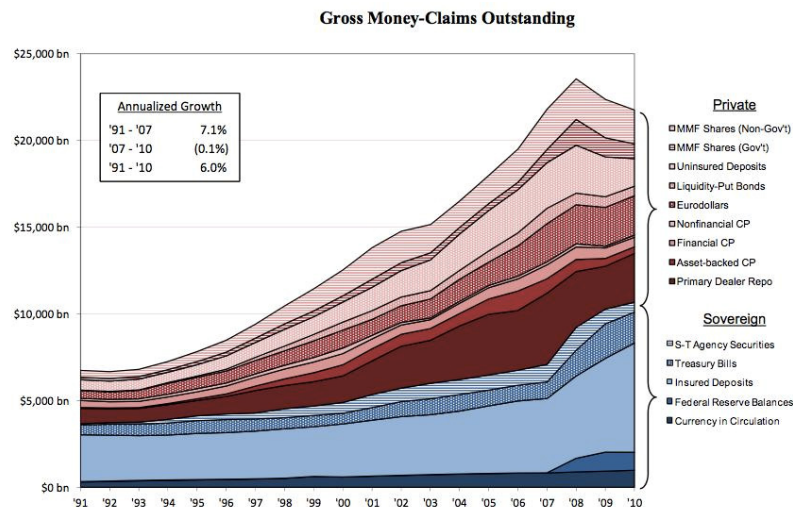
78. Author's calculations based on BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 34, at 79–81.

79. Milton Friedman famously hypothesized that the shrinking of the money supply from 1929 to 1933 helped to prolong the Great Depression. See generally MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, A MONETARY HISTORY OF THE UNITED STATES 1867–1960 (1963).

80. Author's calculations based on Flow of Funds Accounts of the United States. BD. OF GOVERNORS OF THE FED. RESERVE SYS., *supra* note 34, at 79–81.

These data tell a story similar to the one above about the aggregate assets in the shadow-banking system. Ricks breaks all money-claims into those issued or insured by the government (Sovereign money-claims) and those issued by financial institutions including banks and shadow banks. Here we see that in the 1990s and first part of the 2000s, private money-claims expanded rapidly, while sovereign money-claims grew much more modestly. When the crisis hit in 2008, however, the amount of private money-claims in circulation contracted dramatically, as is clear from Figure 6. The Federal Reserve and the Treasury responded by expanding sovereign money-claims quite fast, but the growth in sovereign claims has not been fast enough to offset the decline in private money-claims, so that the aggregate amount of money and money-like instruments in circulation declined substantially from 2008 to 2010.⁸¹

Figure 6: Total Money-Claims⁸²



These data on the aggregate supply of money and money-like instruments in the U.S. economy suggest that the problem was not that M3 was not providing valuable information, but that M3 was not picking up some of the most important information.

Many pundits and commentators have watched what has happened with M1 in the last few years and have expressed concern that the Fed's

81. Professor Ricks has not updated his data to include 2011, but the Flow of Funds data used to construct Figure 5 suggest that private money claims continued to decline through 2011.

82. Ricks, *supra* note 1, at 4 fig.1. Ricks assembled the data for this figure from several sources and notes that some extrapolation was required for the Eurodollars data. *See id.* at 4 n.7.

actions in expanding the money supply, such as through programs that have been called quantitative easing (QE), will lead to inflation in the months and years ahead. But a better window on what is going on in the shadow-banking system suggests that broader measures of the money supply may well still be declining as of mid-2012, which would be contractionary, perhaps even deflationary, rather than expansionary. Measures of the money multiplier also suggest that, even with the Fed continuing to keep interest rates very low and engaging occasionally in open market operations to expand bank reserves in the banking system, broad measures of the money supply may still be declining rather than growing at least through 2012.⁸³ The Fed's efforts at being expansive have not so far fully offset the contractionary effects of the effort by financial institutions to deleverage.

In sum, leverage matters because it determines the amount of new credit that financial institutions can create, and credit, like money, provides the grease that keeps the economy humming. Supplying enough of that grease is important to a well-functioning economy, but providing too much too fast probably causes asset bubbles, generalized inflation, or perhaps both. Excessive credit also exposes the economy to crashes when institutions decide they must reduce their leverage. To get an idea of how severe these problems can be in an economy in which leverage ratios are extremely high in the financial sector, note that if the financial sector is required to hold 8% of its assets in capital, it can support 12.5 times the amount of capital it has in total assets on its balance sheets. But if the required capital ratio falls to 6%, the same institutions will now try to carry 16.7 times the amount of capital on their balance sheets. With a capital ratio at 4%, financial institutions would want to carry 25 times the amount of capital on their balance sheets, at 3%, 33 times, and at 2%—a level that a number of large shadow-banking institutions reached going into the financial crisis—an institution will try to grow its balance sheet to 50 times the amount of capital it has.

More generally, once capital ratios get very low, small changes in target capital ratios result in very large changes in the amount of total assets that financial institutions want to hold. If the ratio is allowed to drop a bit, institutions scramble to make more loans or buy more assets, which will add fuel to any asset bubble already underway. And, on the other hand, if institutions suddenly have to reduce their leverage, they can be forced to reduce the size of their balance sheets dramatically, even

83. As of February 14, 2013, the M1 multiplier, as measured by the St. Louis Federal Reserve bank, was still below 1. See *M1 Money Multiplier (MULT)*, *supra* note 40.

disastrously. The result is substantial systemic instability in financial markets.

We don't have a direct way to measure whether the amount of credit supplied to an economy at any point in time is the right amount or perhaps too much. But the amount of debt held by the financial sector (which is credit to the rest of the economy) in the U.S. economy relative to GDP has more than doubled in the last three decades, going from \$2.9 trillion, or 125% of GDP in 1978, to \$36 trillion, or 259% of GDP in 2007.⁸⁴ During the same period, the supply of money, as measured by M1 and M2, declined as a share of GDP, with M1 going from 16% of GDP in 1978 to 10% of GDP in 2007 and M2 going from 60% of GDP in 1978 to 54% in 2007.⁸⁵ This is just another way of showing that a substantial part of the expansion in credit in the economy in the last three decades must have happened outside of the banking system (where M1 and M2 are created) and in the shadow-banking system.

V. EXCESSIVE CREDIT AND THE ROLLERCOASTER ECONOMY

One reason that the financial crash and recession have been so bad is that, when financial institutions get overleveraged, the process of deleveraging is more painful the more overleveraged the institutions were in the first place.⁸⁶ This is because, when leverage is high to begin with, small changes in leverage can produce very large swings in the total value of assets that financial institutions hold, and if one loan goes bad, it can spill over to cause other loans to go bad. A bad loan at one bank is more likely to cause problems at other banks the more highly leveraged the first bank is. To illustrate this with a simplified example, consider again the bank illustrated in Figure 4, only now assume it has a ratio of debt to total assets of 98%.⁸⁷ This means its balance sheet would look like the following:

84. JOHNSON & KWAK, *supra* note 12, at 59.

85. Author's calculations based on *H.6: Money Stock Measures. H.6: Money Stock Measures*, *supra* note 76.

86. In time series data for the U.S. economy, Tobias Adrian and Hyun Song Shin observe that peaks in leverage among leading banks ("primary dealers") are associated with the onset of financial crises. Adrian & Shin, *supra* note 21, at 615.

87. There were rumors that numerous Wall Street firms may have been this highly leveraged at the beginning of the crash in 2008. Citigroup, for example, was estimated to have a ratio of "tangible common equity" to tangible assets of just over 2% in the first quarter of 2008, or a leverage ratio of almost 98%, while Bank of America's leverage ratio was almost 97%. Rolfe Winkler, *Bank Buffers Increase, Still Not High Enough*, REUTERS (Feb. 11, 2010), <http://blogs.reuters.com/rolfe-winkler/2010/02/11/bank-capital-buffers-increase-still-not-high-enough/> (graphing capital buffers). Tangible common equity is a conservative measure of bank capital. Data on leverage in the shadow-banking system used in Figure 3 are consistent with this.

Assets	Equity
\$1250	\$25
	Liabilities
	\$1225

Here we see that our bank has total liabilities (including deposits) of \$1,225, which, together with the original equity capital of \$25 supports \$1,250 in total assets, for a 98% leverage ratio. Now suppose that the assets consist of twenty-five loans, with a payoff value of \$50 each. Furthermore, suppose that one of those loans defaults and the bank is required to “write off” the total value of that loan, leaving the bank with only \$1,200 in assets.

Note that once this happens, all of the shareholders’ equity has been wiped out, and the bank is insolvent—it has \$1,225 worth of liabilities and only \$1,200 worth of assets. This means that the bank will have to default on one or more of its loans, or it might be unable to pay depositors if they rush to withdraw their deposits. If the bank is a traditional regulated bank, the FDIC, which provides a guarantee for depositors, might take over the bank and protect all deposits to prevent depositors from making a run on the bank to get their money back.

But if the bank had been heavily financed with short-term loans (such as repos), the various lenders to the bank are likely to get nervous; they will not want to allow the bank to refinance its short-term loans or continue to borrow. In fact, the bank might be in default on some of its loans already because its assets have declined. Thus, the bank may be forced to sell some assets so that it can pay off some loans and restore its balance sheet. If numerous other banks are experiencing the same kinds of problems, they will all try to sell assets at the same time. This is likely to drive down the value of those assets in the market, so the bank could find that it has to take another write-down of its assets. A further write-down means that the bank must default on more of its loans, which causes other banks to write down more of their loans to our initial bank. In this way, the crisis quickly spreads to other institutions.⁸⁸

Even if the banks in this economy were all merely lending to and borrowing from each other, the whole system is more vulnerable to financial crises the more leveraged all of its participants are. In fact, the

88. Adair Turner refers to this process as “self-reinforcing credit destruction in the downswings,” and says that it consists of the following: “Banks suffering credit losses which erode their capital and their ability to lend funds, and individual loan officers shocked into caution by the speed with which past assumptions about rising asset prices and good credit quality were proved wrong” and “borrowers cautious in the face of potentially falling asset prices, and of the more general fall in nominal demand which a recession will induce.” Turner, *supra* note 3.

decision that each financial institution makes about how leveraged it will be involves something of a prisoner's dilemma⁸⁹: each institution will be better off—more profitable on average—if it uses more leverage,⁹⁰ but all of the institutions together may be worse off if the system as a whole is more leveraged.⁹¹ This is because there is likely to be more systemic risk in the economy as a whole if most financial institutions are highly leveraged.

In fact, however, it is more complicated than this because there is an offsetting effect of greater leverage in the system as a whole. To the extent that higher systemic leverage drives asset price inflation, as I have argued above, most institutions will not only be better off if they use higher amounts of leverage, they may also be better off in the short run if other institutions use more leverage—at least as long as price levels are still on their way up. This is because aggregate leverage, not just individual leverage, drives asset inflation, and rising asset prices tend to make an individual institution's decision to use leverage look that much smarter in retrospect.

While operating with high leverage ratios is attractive in a rising market, it is deadly if market prices begin to fall, even if by only a tiny amount at first. Thousands of home mortgages in the U.S. were in trouble, for example, even before housing prices started declining.⁹² This was

89. A prisoners' dilemma is a model in game theory which is structured so that if individual participants "rationally pursue any goals . . . all meet less success than if they had not rationally pursued their goals individually." Steven Kuhn, *Prisoner's Dilemma*, STANFORD ENCYCLOPEDIA OF PHIL. (Oct. 22, 2007), <http://plato.stanford.edu/entries/prisoner-dilemma/>.

90. Leverage improves returns for shareholders on average because shareholders capture all of the upside gain if the investments work out, but if the investments do not work out, shareholders are protected on the downside because they have "limited liability." Shareholders take the first hit when investments do not work out, but if there is only a small amount of shareholders equity (or "capital" in banks), creditors will also experience losses when the investments don't work out. These losses do not increase shareholders losses. Thus, on average, higher leverage shifts more risk onto creditors and makes shareholders better off.

91. Viral V. Acharya, Lasse H. Pedersen, Thomas Philippon & Matthew Richardson, *Measuring Systemic Risk* 5 (Fed. Res. Bank of Cleveland, Working Paper No. 1002, 2010) (noting that banks and other financial institutions do not take into account the full cost of risks they take, especially due to leverage, because much of the costs of that risk are externalized to other financial institutions or creditors or to society at large).

92. Michael Simkovic, *Competition and Crisis in Mortgage Securitization*, 88 IND. L.J. (forthcoming 2013) (reporting that the rate of default on subprime mortgages, Alt-A mortgages, and prime mortgages increased quite dramatically in 2005 and 2006 while home prices did not peak until 2007); see also *Home Prices Rose in the Second Quarter of 2012, According to the S&P/Case-Shiller Home Price Indices*, S&P DOW JONES INDICES (Aug. 28, 2012), <http://www.standardandpoors.com/servlet/BlobServer?blobheadername3=MDT-Type&blobcol=urldocumentfile&blobtable=SPCComSecureDocument&blobheadervalue2=inline%3B+filename%3Ddownload.pdf&blobheadername2=Content-Disposition&blobheadervalue1=application%2Fpdf&blobkey=id&blobheadername1=content-type&blobwhere=1245339137830&blobheadervalue3=abinary%3B+charset%3DUTF-8&blobnocache=true>.

because numerous investors bought houses (or invested in housing related assets) with very little money down, counting on the idea that as house prices went up, the borrowers could refinance if they couldn't make the mortgage payments on the original loan. Such investors were likely to be in trouble even if housing prices simply stopped rising.

Once an asset bubble peaks in a highly leveraged economy, all of the machinery that was expanding leverage, expanding credit, and encouraging additional spending on assets goes into reverse. Now Bank *A* will be one of the first in trouble if it was too highly leveraged. When Bank *A* defaults, that will rapidly ripple out to other institutions.

In this way, if leverage is not regulated and limited, the financial sector will tend to employ too much leverage, even if all participants in a market economy are rational. Other things being equal, excessive leverage, in turn, is likely to promote boom and bust cycles in the real economy. Boom and bust cycles tend to be devastating, however, not just to investors who bought inflated assets at the peak, but also to millions of individuals who do nothing more than take jobs in the booming part of the economy. When the bust part of the cycle hits, individuals at the margins of the labor market tend to bear the brunt of the decline in economic activity. This includes minorities, those with low skills, new high school graduates and college graduates who were not employed before the crash and have very little experience, and even older people who work in parts of the economy that depend heavily on surplus disposable income, such as tourism.

Meanwhile, individual bankers, traders, brokers, and other financial intermediaries who helped to create the bubble may actually be better off in a rollercoaster economy and thus have significant incentives to try to impede reform, especially reform that would limit leverage. The reason is that compensation practices in the financial sector of the economy often allow certain financial sector employees to get paid enormous sums of money during good years, without having to pay back that money in bad years.

VI. CONCLUSIONS

Much of the policy discussion about financial market reform in the wake of the most severe financial crisis since the Great Depression has focused on protecting consumers and preventing future bailouts of financial institutions. But the most important reform that needs to be made is to develop, institute, and enforce limits on the ability of financial market firms to create too much credit and operate with too much leverage. Credit used safely and prudently makes it possible for businesses and individuals to invest more than they could if they were limited to using

only their own savings. Thus, economies tend to grow faster when credit is readily available. But relying on too much credit makes individuals and businesses vulnerable to any interruption in income that they are counting on to service the loans they have taken out. Moreover, that instability can easily spill over into the rest of the economy, so that, if numerous financial institutions are over-leveraged, the whole financial system is likely to be unstable.

Credit has this effect because it provides an alternative to money and acts like money in stimulating the economy. This can be a good thing when an economy is growing too slowly, but if used to excess, it can lead to dangerous asset bubbles. Worse, excessive leverage in the financial sector can set the stage for sudden and catastrophic contractions when multiple financial institutions try to deleverage quickly and at the same time.

In retrospect, it is easy to see that the financial system in the U.S. and around the world was growing increasingly vulnerable to booms and crashes in the first decade of the twenty-first century. However, financial market actors tolerated the instability for a long time, and perhaps even encouraged it, because the effects of excessive leverage seemed benign in the upswing parts of boom and bust cycles. Moreover, people who work in the financial sector tend to make huge amounts of money during the bubble part of the cycle, money that they, for the most part, do not have to pay back when the bubble collapses.

For this reason, financial markets will not be self-correcting and self-regulating. If financial firms and financial markets are not more tightly regulated to limit the amount of leverage that can be used, the outcome will be more bubbles, more crashes, and even greater income and wealth inequality as finance captures a growing share of society's resources.