Financial Innovation and the Distribution of Wealth and Income

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Abstract

Now that Congress has passed the Dodd-Frank Wall Street Reform and Consumer Protection Act, regulators promulgating the rules under this new bill must tackle a major problem that the reform bill addresses only indirectly. This is the problem of excessive "leverage" – financing with too much debt. Leverage permeates the modern financial system. Leverage makes the system *too large*, in the sense that large parts of the system operate outside the reach of regulators, and the system has a tendency to create vastly too much money and credit, thereby causing asset bubbles. Asset bubbles create the illusion that the financial sector is adding substantially more value to the global economy than it really is, and expose the rest of the economy to too much risk. Moreover, too much of society's resources go to compensate the people in the system who are causing this to happen.

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Introduction.

Although Congress has passed, and the President has signed the Dodd-Frank Wall Street Reform and Consumer Protection Act, one of the most important problems facing regulators is scarcely addressed in the bill, leaving it to regulators to address as they work out the details of a new regulatory scheme. This is that financial innovation has made it possible for financial firms to utilize vastly too much "leverage" – to supply too much credit to others, and to borrow too much in order to provide this credit. The effect has been a financial system in the U.S. (and globally as well) that is too large in several senses: It uses too much debt, it creates too much credit, it thereby fuels asset bubbles that expose the rest of the economy to too much risk, and its employees and investors are paid way too much for the privilege of subjecting the rest of the economy to these problems.

This assertion challenges the pre-crisis conventional view that many policy analysts and scholars have expressed, that growth and innovativeness of the financial sector unequivocally improves the efficiency with which investors save and capital is aggregated and deployed to finance productive investment (Rajan and Zingales, 1998; Baily, et. al. 2008; Litan; 2010), and helps to allocate risk to those who can most efficiently bear it (Rajan, 2005; Bernanke, 2007; Geithner, 2008; Smaghi, 2010; and Konczal, 2009). The recent financial market crisis, however, provides good reason to challenge these claims. Financial services and financial innovation undoubtedly facilitate productive investment up to a point. But in the last few decades, the U.S. economy has invested a growing share of GDP in a financial system that, at the margin at least, is using too much debt, creating too much credit, and absorbing more in the way of social and economic resources than it is producing.

Regulators now confront a financial sector that has grown too large in several senses:

First, financial innovation has made it possible for numerous financial institutions that are outside the regulated part of the banking system to provide credit, liquidity, and money-like financial instruments. This network of non-bank institutions, together with the securities they issue and trade,

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has been called a "shadow banking system" because, while it has become integral to the way regulated banks operate, it operates largely outside the regulations that govern banks and other depository institutions (Adrian and Shin, 2009). Activity in the shadow banking system facilitates the use of much higher levels of leverage than can or would be used in the formal banking system, and 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 do them. Many of these transactions may have facilitated useful investment in the real economy, but a substantial share of the extra transactions made possible by the shadow banking system has been wasteful, or even destructive.

The shadow banking system was constructed largely for the purpose of hiding leverage from regulators, or getting it outside of their reach. But regulators and legislators consciously chose not to intervene, not to try to extend regulatory oversight to these new institutions and new types of financial instruments (Konczal, 2009). The Dodd-Frank Act gives various regulatory bodies the authority, and some of the tools they need to begin actively regulating parts of the shadow banking system. But regulators must have the will to act, and be sufficiently protected from the political influence of the financial sector to do so.

Second, other scholars and policy analysts have argued that problems in the financial system arise because large banks and other financial institutions are "too big to fail" (Johnson and Kwak, 2010). This is one facet of the problem. But a more serious problem is that the system in the aggregate is too big and too highly leveraged. Regulators have not been able to prevent institutions outside the banking system from operating with excessive leverage and engaging in other high risk transactions, as AIG and many others did. The Dodd-Frank Act addresses this problem only indirectly, authorizing the Board of Governors of the Federal Reserve System to take over the regulation of financial institutions deemed to be a threat to the safety and soundness of the financial system. Yet it may not be clear which institutions constitute such a threat until it is too late for regulators to prevent a panic aimed at assets in the shadow banking system, such as what we saw in the fall of 2008 (Gorton and Metrick, 2009; Covitz et.al., 2009; Cecchetti, 2009; Brunnermeier, 2009).

The objection that many economists and policy analysts may make to my assertion that the system is too large and too highly leveraged arises from an assumption that an efficient and unregulated capital market will not, consistently and systematically, provide "excessive" credit, 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 bank institutions should refuse to provide further financing if the institution gets too highly leveraged. And 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

I argue, however, that financial markets might not always be self-correcting even if all investors are fully rational. Why? 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, pushing up prices in the same way that printing excess money would be expected to drive up inflation. Unregulated financial firms can create an almost endless supply of credit simply by operating at higher degrees of leverage.[2] Leverage greatly enhances the return on equity for bank shareholders and other investors

[2] In certain sectors of the financial market, "leverage" has become a term of art that means 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

in the shadow banking system in good times, when 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, investors in a financial firm do not bear all of the costs when that firm fails. This is because the failure of a single institution may force that institution to sell assets, and this can drive asset prices further down, causing other institutions to have losses so that they too are forced to sell (Brunnermeier, 2009). In extreme situations, as we have seen in the recent financial crisis, taxpayers may be called upon to prop up troubled institutions to prevent a downward spiral of asset prices that can devastate the whole economy.

This gives us a third sense in which the financial sector is too large: For the reasons reviewed above, and others which I will explain 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 whole tends to generate too much credit if it is not prevented from doing so by regulators.[3]

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 the "quantity theory of money" from Econ 101. The idea behind the "money multiplier" is that 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 (the "Fed"). Nonetheless, the Fed can roughly control the amount of money banks add to the economy by regulating banking activity. And in this way, the Fed can try to prevent inflation by keeping the supply of money from growing too fast. An innovative financial sector, however, can create lots of substitutes for money (such as credit cards, money market mutual funds, lines of credit, and commercial paper), and these substitutes are not as well regulated as traditional banking activities are. A rapid expansion in vehicles that provide credit to the economy can have the same effect that we would expect from a rapid expansion in the money supply. Moreover, the ability of the financial system to provide credit instruments is dramatically increased as financial firms themselves rely heavily on debt or leverage. In this way, excessive leverage in the system as a whole has increased the effective supply of money and credit. And, I argue, repeated cycles of excess credit 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 asset prices are driven up by the stimulus of excessive leverage, financial market participants who financed the investments in the assets are regarded as brilliant investors (for a while at least). They, and others, may forecast further price increases, and these forecasts serve to justify supplying more credit to investors in those asset classes, which helps to further drive up prices in a self-fulfilling way. When prices of broad classes of assets go up generally, most investors experience themselves as making money by buying and selling such assets. 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

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usage of the term, it means the ratio of debt to equity, or debt to total assets. All of these ratios are ways of measuring the degree to which a firm or investor is relying on borrowed money to make its investments.

[3] John Geanakoplos (2009) provides a fully developed analysis of the role of leverage in the business cycle, and other scholars have begun examining the relationship between excessive leverage and asset bubbles (Adrian and Shin, 2010).

as a whole as it invests in, and trades those assets whose prices are being bid up. (See! They must be creating wealth because the portfolios they are managing are going up in value!)

The standard story about the causes of the financial crisis emphasizes that financial institutions were investing in "risky" assets. 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. What is often missing in this "risky asset" story, however, is what it was that made the investments so risky, and simultaneously 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?

I argue below that, while investors are generally risk averse, they also have a strong tendency to become addicted to leverage in boom times, because leverage can boost the returns even on mediocre investments. For this reason investors were repeatedly willing to turn resources over to people who work in the financial sector who were using high levels of leverage. Moreover, they allowed financiers to take money out in the form of wages and bonuses for creating and trading securities that were exceptionally risky. In this way, leverage in the system as a whole allowed the financial sector to take out a growing share of national income in the form of wages, salaries, fees, and bonuses, causing compensation per employee in the financial sector to grow from $20,000 per year in 1980 to nearly $100,000 per year per employee (including secretaries and clerks) in recent years – 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 that appeared to more than offset the costs of their own compensation. Investors are more than happy to pay high fees, salaries, commissions and bonuses to financial market actors who arrange financing for them on good terms, or help them get into investments that appear to be making money. As long as the bubble had not yet burst, the illusion of value creation thus caused investors to accept higher leverage, and to justify extraordinary compensation packages for the participants in the financial sector. In this way, bubbles redistribute wealth and income to the people whose actions, collectively, are causing 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.[4] 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 (Kaplan and Rauh, 2007; Philippon, 2008; Philippon and Reshef, 2009).

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 this, but consider what gross domestic product (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. In other words, the financial sector captured three percentage points more of GDP – about $412 billion worth – in 2007

[4] Nelson Schwartz and Louise Story (2010) reported recently, hedge fund managers were paid hundreds of millions of dollars even in the disastrous year of 2008, and by 2009, were capturing billions of dollars per year again.

than it had in 1980. This is equivalent to a transfer of about $1365 from every person in the U.S. in 2007 to the financial sector and to the people who work in that sector.

Meanwhile, much of the value we thought was being 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, U.S. GDP was $648 billion lower as a result of the financial crisis than it otherwise would have been (Pew Economic Policy Group, 2010). In addition, some $3.4 trillion in apparent real estate wealth had disappeared, and another $7.4 trillion in apparent stock market wealth had also been lost.

Finally, one of the most troubling aspects of the fact that the financial sector takes such a large share of total national income and wealth is that wealth captured by financiers (or by any special interest group) can be used to influence policy and resist reform. In this way, income inequality (as well as a bubble-prone economy) may be able to perpetuate itself because wealthy financiers have much greater access to the halls of power in Washington and in the regulatory agencies.

I. Explosion in Financial Innovation.

A. "Disintermediation" from the Banks in the 1970s

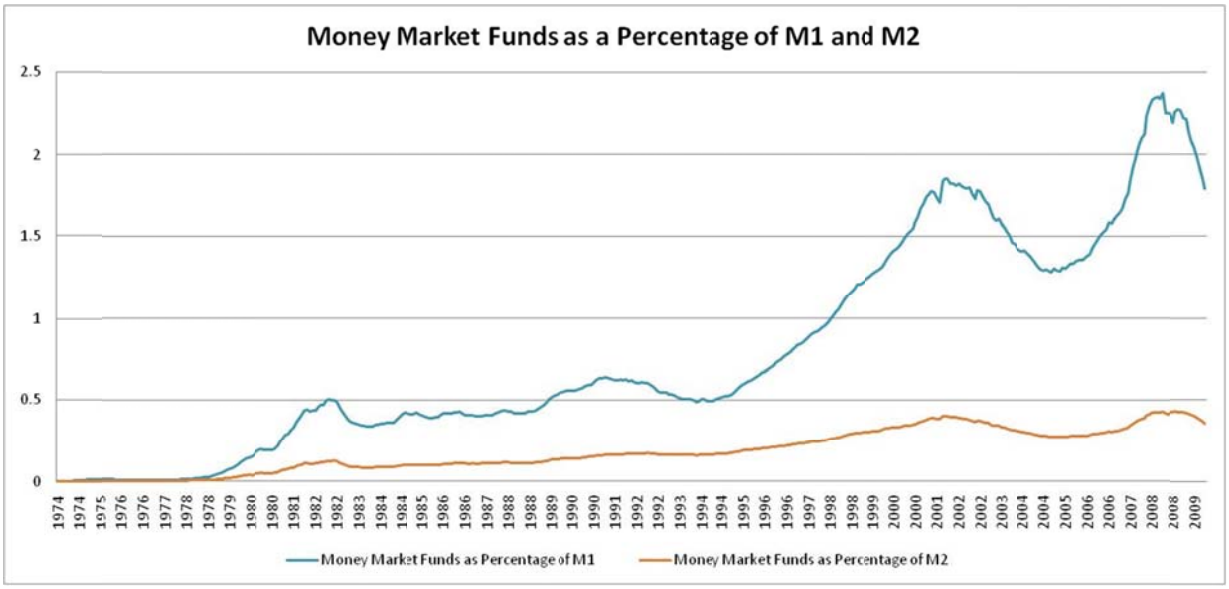
The financial system in the U.S. is vastly different today from what it was three or four decades ago, with many more institutional players, offering different kinds of savings vehicles, credit vehicles, and financial services. The changes that are important to this story have their roots in the period of high inflation in the U.S. in the 1970s (De Long, 1995). At that time, banks were restricted in terms of the interest they could pay on deposits. With inflation exceeding 10% by the end of the decade, individual and institutional investors were interested in finding safe alternatives to deposits that would pay attractive interest rates. Financial institutions responded by developing "money market mutual funds."[5] Money market mutual funds are not insured by the FDIC like deposit accounts at banks, but they were backed by large and seemingly highly-secure financial firms as well as regulated by the SEC (which regulates all mutual funds). And they were required to hold relatively safe short-term instruments such as Treasury bills, certificates of deposits (issued by banks), and commercial paper.

These new vehicles for savings were important because they provided very liquid assets for investors which could, like "money" in cash or checking accounts, be readily spent on investment or on consumption. But these funds were managed by institutions that were not regulated by the Federal Reserve or the Federal Deposit Insurance Corporation (FDIC). Data from the Federal Reserve show that in December of 1974, there was only about $1.6 billion invested in money market mutual funds (both retail and institutional) in the U.S., which compared with about $902 billion of so-called "M2", which is all currency, checking accounts, travelers' checks, small time deposits and

[5] A "money market mutual fund" (also called a "money market fund") is a type of mutual fund that is required by law to invest in low-risk securities, such as short-term bonds. By contrast, a "money market deposit account" is an account available at banks that earns interest at a rate set by the bank based on rates available in money markets. Money market deposit accounts usually impose limits on the ability of customers to make withdrawals, so they are not as liquid as checking accounts.

savings accounts at banks and depository institutions, bank CDs, and retail money market mutual funds. [6] Fig. 1 below shows how the dollar value of money market mutual funds has grown since then as a percentage of M1 (currency, checking accounts and travelers' checks only) and M2. The aggregate value of money market funds peaked at about 230% of M1, and 43% of M2 in the spring of 2009.[7]

Fig. 1. Growth of Institutional Money Market Funds



Source: Author's calculations based on Federal Reserve Statistical Release, "H.6, Money Stock Measures, Table 4." April 15, 2010.

As is suggested by this figure, money market mutual funds (both retail and institutional) are now a major part of the "shadow banking system" in the U.S., a vast system by which savings of individuals and short-term assets of business are aggregated, and credit is provided to individuals and businesses outside the channels of traditional banking.

B. Junk Bonds

A major financial market innovation of the 1980s was the use of high-yield "junk" bonds to finance leveraged buyouts. "Junk" bonds are bonds that are rated below investment grade (BB or lower) by credit rating agencies. "Leveraged buyouts" (LBOs) were so-named because they were transactions in which an investor or group of investors (LBO entrepreneurs) bought all, or controlling interests in the equity of publicly-traded companies to take the companies private. They paid for their purchases

[6] Retail money market mutual funds (those available to small investors) are included in the Fed's measure of "M2", but institutional money market funds (those available to corporate and institutional investors) are not. Institutional money market funds were included in the Fed's broader measure of money, "M3," until the Fed stopped measuring M3 in early 2006.

[7] Money invested in money market mutual funds has declined somewhat relative to M1 and M2 since the end of 2007, partly because M1 and M2 have grown as the Fed has added money to the economy to help stave off recession, and also because nervous investors moved funds out of money market mutual funds and into instruments they believe are safer such as insured bank accounts (part of M1 or M2) or into short-term Treasury securities.

with money borrowed by using the expected cash flow of the acquired firm as collateral, and they planned to pay off the debt by restructuring and dismantling the firms, sometimes retaining a valuable core of the business. The LBO entrepreneurs were often able to borrow as much as 90% or more of the purchase price, a previously unheard of degree of leverage in corporate financing outside of the banking system itself.

Because the leverage used was so high, some or all of the bonds issued by the buyers to finance the acquisition were considered quite risky, and therefore paid an unusually high interest rate, giving them their polite name of "high-yield bonds," and their pejorative name of "junk bonds." The advantage to issuing firms of using junk bonds was that they were thereby able to bypass the banks and raise money without subjecting themselves to the oversight that a bank would (presumably) insist on if the firm borrowed the money from the bank. Moreover, most banks would not have loaned money at all to firms with leverage ratios (debt/total assets) of 90% or more. Investors have been willing to buy these securities for their portfolios, on the other hand, because they believed that a substantial part of the default risk associated with these securities could be "diversified" away[8] (although the willingness of investors to invest in junk bonds varies greatly between good times and bad times). Although leveraged buyout activity subsided, junk bonds have continued to be important financing tools for the corporate sector in the U.S., representing 8.9 percent of all corporate offerings in 1999, and 6.6 percent of all corporate offerings – some $210 billion worth – in 2009 (Keogh, 2010).

Junk bonds played a niche role in the financial market crisis of 2007 – 2009. Many regulated financial institutions, such as banks, money market funds, and pension funds, are not allowed to invest in junk bonds because they are, by definition, below "investment grade". Thus in recent years some financial market players have constructed portfolios of junk bonds and "securitized" these portfolios by selling new securities backed by the portfolio of junk bonds. The cash flows on a portfolio of bonds can be divided up in such a way that some of these secondary securities are classified as very safe. This means that banks, insurance companies, money market funds, and pension funds are permitted to hold them. Recent estimates indicate that as much as $700 billion of high-yield corporate debt is currently outstanding and will come due and need to be paid off or refinanced from 2012 through 2014 (Schwartz, 2010).

C. Private Investment Funds

An important financial innovation in the 1990s and 2000s was the development of private investment funds such as venture capital funds, private equity funds, and "hedge" funds.

Private investment funds operate outside the regulated part of the financial sector. They can do this because they only accept investments from wealthy individuals and financial institutions that are considered to be sophisticated investors under the terms of the Investment Company Act, which regulates mutual funds and other investment companies that are open to investment by less sophisticated individual investors. Venture capital funds specialize in providing financing for start-up companies and firms that do not yet have sufficient cash flows or promise of profits in the future

[8] One of the leading proponents of using junk bonds to finance takeovers was Michael Milken, at Drexel Burnham Lambert, who argued that junk bonds were good investments for investors, because the risks associated with junk bonds could be diversified away (Henderson, 1994). In the last decade, the illusion that the default risk of junk bonds could be diversified away was enhanced through the use of "securitization" of these bonds and derivative products that were supposed to offset remaining risk. See sections below on securitization and derivatives.

to be able to sell equity shares to the public. Private equity funds typically invest in large blocks of publicly-traded companies to get control, or they buy out the entire company to take it private and restructure it, with the idea of selling it back to the public again some years later. Hedge funds specialize in investing in commodities, currencies, and derivative securities. All of these classes of investment are potentially very high risk, and therefore many banks and regulated financial institutions are restricted in their ability to make such investments directly.

The U.S. government doesn't collect data on the private investment funds part of the financial sector, but Kaplan and Rauh (2007) report data from several consulting firms that indicate that, as of 2005, hedge funds had approximately $900 billion to $1 trillion under management, while venture capital funds had about $26 billion, and private equity funds had about $131 billion. This compares with total financial assets in the commercial banking sector of about $7.28 trillion in 2005. Participants in this sector, especially hedge funds, were actively involved in the speculation and trading that led up to the financial crisis. The private investment fund sector has operated largely outside the reach of regulatory authorities, although the Dodd-Frank Act provides that any such firm can be subject to regulation by the Federal Reserve if it is identified as posing a threat to the stability of the financial system.[9]

D. Asset Securitization

One of the most important processes by which non-bank financial firms have taken over large parts of the financing activity that historically would have been done by banks had its start, ironically, in financial innovation by the U.S. government. This is the process of "securitization" of financial assets. Prior to the 1980s, banks that made loans to businesses or individuals usually held the loans in their own portfolios until the loans were paid off. In the 1970s, in an effort to make it easier for families to buy houses, the Government National Mortgage Association (GNMA, or "Ginnie Mae") began buying mortgages from banks, so that banks could then reinvest the money they received for old mortgages in newly issued mortgages. GNMA formed portfolios or pools of mortgages that they purchased from banks and then sold securities based on the cash flow from these mortgages. In the early days of securitization of mortgages, the securities offered a pro-rata share in the income from an entire bundle of mortgages backing the security.[10] But by the late 1980s, when the Federal National Mortgage Association ("Fannie Mae"), and the Federal Home Loan Mortgage Corporation ("Freddie Mac") began securitizing mortgages, the securities were "tranched" meaning that they were structured so that some classes of securities were to receive the income from the mortgages that were paid off first, and other classes were to be paid only after the more senior classes were paid. If, in general, no more than 5% of a particular pool of mortgages would be expected to default, a claim on the first 50% of the mortgages to pay off would be very low risk because the default risk would all be concentrated on the securities whose claims are based on the second 50% of mortgages to be paid off (of which, 10% would now be expected to default). The security that represents a claim on the first "tranche" of mortgages, then, might then receive a high enough credit rating that regulated financial institutions would be allowed to invest in them (Brunnermeier, 2009). Banks, in particular, were not required to hold as much risk capital relative to investments in securitized instruments as they would have been required to hold to be invested in the original loans (Stulz, 2009). In other words, they could invest in "mortgage backed securities (MBS) on a more highly leveraged basis than they could when investing directly in the mortgages.

[9] Dodd-Frank Wall Street Reform and Consumer Protection Act, §113.
[10] This structure, in which there are no classes of securities, and no priorities are established, is called "pass through securitization" (Coval, Jurek, and Stafford, 2009).

Once the model of securitizing mortgages fully developed, banks and investment banks applied the idea to other classes of assets, such as automobile loans, credit card balances, insurance policies, corporate bonds, including junk bonds, student loans, equipment leases, and small business loans. The general name for these securities is "asset-backed securities," (ABS). From 1995 through 2004, ABS amounts outstanding grew by 19 percent per year (Sabarwal, 2005).

From 2000 onward, the packaging and reselling of financial assets through securitization proceeded at an extraordinary pace, and financial institutions found that, if they could sell off their loans as soon as they make them, they would capture the transaction fees for creating the individual loans, and the servicing fees for serving as the collection agent for those loans, but they could quickly recover their investment dollars, enabling them to turn around and do it again, and again, and again.[11] This process made a virtual avalanche of credit available to individuals and businesses (Brunnermeier, 2009).

The repackaging of credit instruments through securitization made individual securities as well as whole classes of securities more opaque, in that it became difficult to assess the actual riskiness of the securities. This problem was made worse by the practices of bundling ABS together and issuing new securities (called "collateralized debt obligations" or "CDOs") based on pools of ABS. Even worse, at the peak of the bubble, some investment banking firms and other participants in the credit markets were actually creating so-called "synthetic CDOs," which were securities with no assets backing them that were designed, rather like fantasy-league baseball teams, to provide a payoff that mimicked a portfolio of actual securities. Synthetic CDOs were pure bets in which neither side of the bet necessarily owned the underlying mortgages, or loans, or asset-backed securities on which the bet was based. Depending on the details of how they were structured, they could give the parties to the bet the same schedule of gains or losses as if they were holding the actual assets, but with little or no money down, creating the possibility of an almost infinitely leveraged investment!

As it became increasingly difficult to evaluate the riskiness of these layers of securities, financial firms began adding insurance policies to the bundles to ensure that the credit rating agencies would still classify them as low risk. These insurance policies were designed to pay off if the assets underlying the securities went into default. These insurance policies were not called "insurance," however. They were called "credit default swaps" (CDS). This was important because if they had been classified as insurance contracts, they likely would have been regulated by insurance regulators at the state level in the U.S., and the sellers of the policies might have been required to hold sufficient collateral to be able to make good on their promises to pay in the event of default.[12] "Swaps," however, are a type of derivative contract, which I take up in the next section. Importantly, swaps were not regulated or traded on exchanges, although this will change under the new financial reform law.[13]

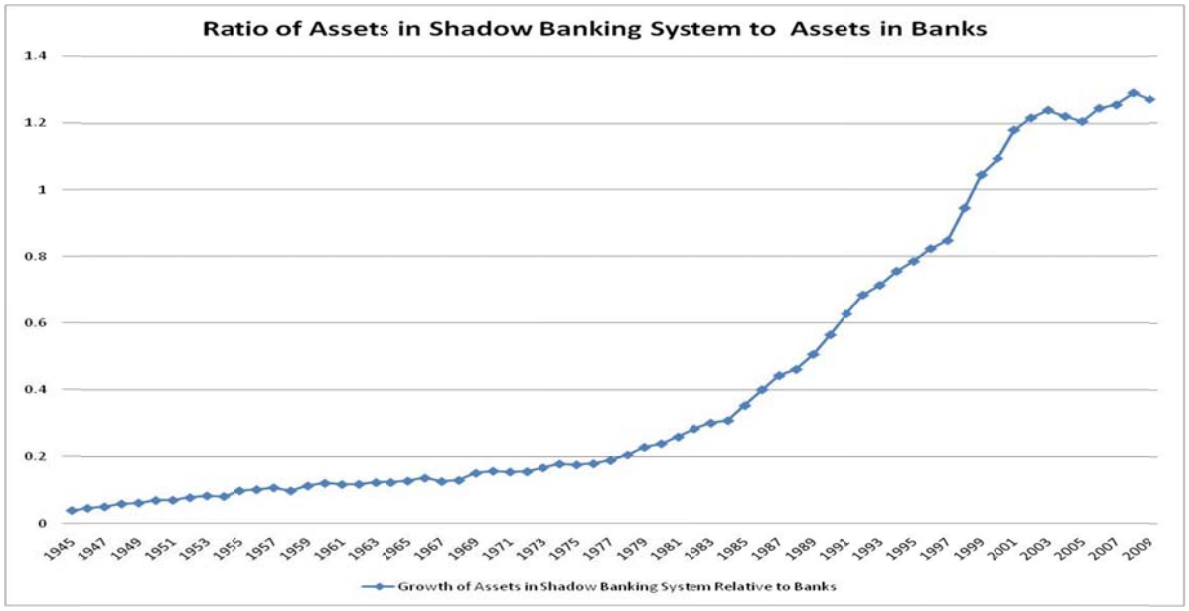
[11] The Securities Industry and Markets Association estimates that from 2002 through 2008, 55 to 60% of home mortgages were securitized, while around 30 to 35% of commercial mortgages, multi-family mortgages, and consumer credit was securitized. (SIFMA, 2008).

[12] Because CDS issuers were not required to hold much in the way of collateral for their potential obligations, the issuers of CDS were also able to operate with extraordinarily high effective leverage. See discussion of leverage in parts II and III below.

[13] Under the terms of the Dodd-Frank Act, an exchange will be created for trading of standardized swaps, and such swaps will be required to go through this exchange. Cite to statute. But these rules will not affect customized swaps. Most of the swaps implicated in the financial crash were actually customized.

As the business of issuing and trading of securitized credit instruments grew in the last couple of decades, several new categories of credit market institutions have become important, and the Federal Reserve has begun collecting aggregate data on the activities of these institutions. Fig. 2 below shows the growth in assets in a subset of financial institutions in the "shadow banking system" that are active in securitizations,[14] relative to total assets in traditional depository institutions, including banks, savings institutions, and credit unions. As is clear from this figure, growth in the securitization part of the shadow banking system took off during the 1980s, and this subset of the financial sector now accounts for substantially more in total assets than do traditional depository institutions.

Fig. 2. Growth in Assets in Shadow Banking System Relative to Assets in Banks



Source: Author's calculations based on Federal Reserve Flow of Funds, tables _____.

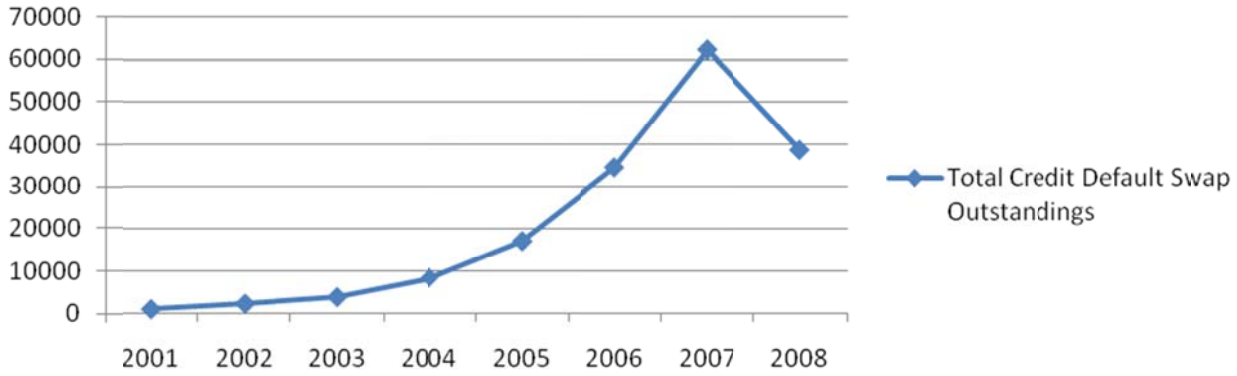
E. Derivatives

Since the mid-1990s, hedge funds have led the way in a massive expansion in issuing and trading derivatives. Derivatives are contracts whose value depends on some underlying asset. Asset-backed securities are "derivatives" in the sense that their value is "derived" from the mortgages or loans that back them. But a number of other types of derivatives do not have assets backing them. Such derivatives are actually better understood as bets. Swaps and options, for example, are essentially bets that counterparties make among themselves about whether some underlying asset will decline in value, or increase in value.

[14] These include government-sponsored enterprises such as Ginnie Mae and its cousins, Fannie Mae and Freddie Mac; plus a category called "Agency- and GSE-backed mortgage pools" which are specially-created entities that exist solely for the purpose of holding mortgages backed by GSEs, and issuing the securities based on them; plus a category called "ABS issuers," which are similar to the mortgage pools but they hold other kinds of loans such as student loans or credit card loans; plus finance companies, which includes firms like GE Capital that are subsidiaries of non-bank corporations but that exist to provide credit to customers of GE; plus brokers and dealers.

Derivative transactions are usually explained as a mechanism for hedging other positions in the portfolios of the parties to the transaction. "Credit default swaps" (CDS), for example, were ostensibly sold to provide insurance for the holders of ABS and CDOs, so that if the underlying loans defaulted, the holder of the securities based on those loans would be protected.[15] Reliable records on CDS were not kept until 2001, and in that year, the notional value of all CDS at the end of the year was $919 billion (see Fig. 3.). By the end of 2005, there were $17 trillion worth of CDS outstanding, almost twice the total amount of household mortgage debt at the time.[16] And at the peak of CDS activity, in 2007 (just before the financial market collapse), there were $62 trillion worth of CDSs outstanding – almost twice the total of all credit market assets held by the financial sector in the U.S.[17]

Fig. 3. Total Credit Default Swaps Outstanding (Billions of USD)



Source: International Swaps and Derivatives Association, "ISDA Market Survey." 2007. http://www.isda.org/statistics/pdf/ISDA-Market-Survey-historical-data.pdf

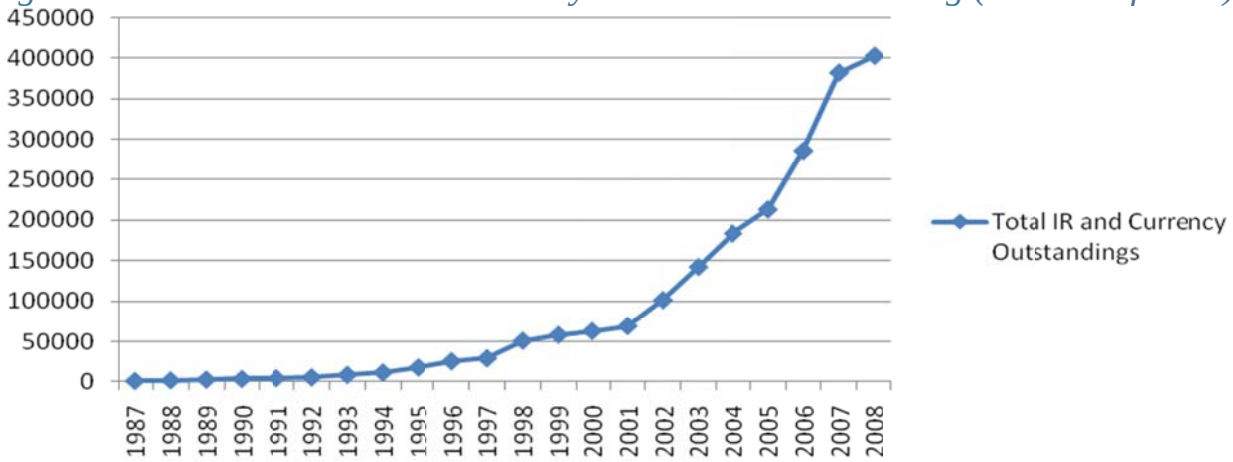
This strongly suggests that some CDS and other derivatives were not really being used to offset risk associated with holding the underlying debt. No well-run insurance company would sell a homeowner $1 million worth of insurance on a $500,000 house because that would give the homeowner a huge incentive to burn the house down. The same logic should apply to the derivatives market. By the mid-2000s, however, many institutional investors that were buying CDS did not hold the underlying loans or mortgages, nor even any ABS or CDOs based on them, in their portfolio. And some investors that did hold the underlying assets were vastly "over-insured."

The only way to make sense of what was happening is to understand that to "over-insure" is a way to place a bet which you win if the bad event occurs. In the mid-2000s, financial market participants were using derivatives not so much to offset other risks, but to place bets with each other about a whole variety of financial indicators and securities. By the mid-2000s, for example, there were vastly more currency and interest rate swaps outstanding than could possibly be needed to offset underlying risks in currency and bond markets that the bettors were actually bearing. In Fig. 4, we

[15] Because CDS supposedly provided such protection, banks that invested in MBS, ABS, or CDOs were not required to hold as much capital if the bank also held CDS protecting those instruments, so the availability of CDS made it possible for banks to leverage themselves even higher. Cite to regulation covering this.
[16] Federal Reserve Flow of Funds Accounts, Table L.100 reports that in 2005, households and non-profit organizations had total house mortgage debt of $8.848 trillion (Board of Governors, 2010).
[17] Federal Reserve Flow of Funds Accounts, Table L.100 reports that the financial sector of the U.S. economy held $36.535 trillion in credit market assets in 2007(Board of Governors, 2010).

see that, by 2007 there were nearly $400 trillion worth of other derivatives (interest rate swaps, currency swaps, interest rate options, and equity derivatives) outstanding. Because derivatives permit an investor to bet on an underlying market with very little up-front commitment of funds, they can be extremely highly-leveraged investments.

Fig. 4. Total Interest Rate and Currency Derivatives Outstanding (Billions of USD)



Source: International Swaps and Derivatives Association, "ISDA Market Survey." 2007. http://www.isda.org/statistics/pdf/ISDA-Market-Survey-historical-data.pdf

F. "Repos"

"Repurchase agreements," nicknamed "repos" in the credit markets, are exchanges in which one party, usually a financial firm, sells a financial instrument to another financial firm at a discount to its market value, with a promise to buy the instrument back a short time later at its full market price. The difference between the price the seller gets and the price the seller will have to pay to buy the instrument back provides a return to the buyer for the use of the money during the intervening days. Thus a repo is very much like a secured loan, in which the "borrower" puts some asset such as a treasury security, or a bond, or a CDO, into a collateral account until the borrower pays off the loan. An important legal difference between a repo and a secured loan is that in a repurchase agreement, legal title to the underlying security actually passes to the purchaser.[18]

Repurchase agreements can have terms of several months or more, but they have come to be used by financial firms for very short-term funding needs, especially for overnight borrowing. Repos have been regarded as very safe and liquid investments for banks and money market mutual funds because they are typically quite short-term, and the investor/lender can always take possession of the underlying asset if the seller/borrower defaults.

In the last few years leading up to the financial crisis, investment banks and other brokers and dealers came to rely heavily on repos as a source of funding, with repos accounting for more than a third of total liabilities of brokers and dealers from 2005 – 2007 (Board of Governors, 2010).[19] Banks have also increasingly turned to repos as a source of investment funds to supplement deposits,

[18] The possibilities are more complicated than this summary suggests, since for some types of repos the security is held by a third party. These are sometimes called "tri-party repos". But those details are not necessary for my purposes in this essay.

[19] .

with repos in some recent years accounting for as much as 9% of commercial bank liabilities (Board of Governors, 2010).[20] Data on repos have been collected only sporadically, but the Bank of International Settlements estimates that the repo market doubled in size from 2002 to 2007, when gross amounts outstanding totaled about $10 trillion each in the U.S. and Europe, and another $1 trillion in Britain (Hordahl and King, 2008; Gorton, 2010a; Gorton, 2010b).

One of the factors that may have been driving the use of repos is that the accounting treatment of these transactions is somewhat flexible, depending on the details of the particular agreements. In cleaning up the mess following the bankruptcy of Lehman Brothers Holdings, Inc., a subsidiary of the investment banking firm that collapsed in September of 2008, for example, investigators uncovered evidence that Lehman Brothers classified large quantities of repos as "sales" transactions, rather than financing transactions, thereby hiding as much as $50 billion in effective debt both from the market and from regulators (F. Johnson, 2010). In late March of 2010, the Securities and Exchange Commission undertook a broad investigation of about two dozen large financial and insurance companies to see if other firms have similarly been misusing repos to hide debt. In early April, the *Wall Street Journal* reported that at least 18 large banks, including Goldman Sachs Group Inc., Morgan Stanley, J.P. Morgan Chase & Co., Bank of America Corp. and Citigroup Inc. were understating their debt levels throughout 2009, and into 2010 by an average of 42%, mostly by engaging in repo transactions at the end of each quarter in which they temporarily "sold" assets in exchange for cash (Kelly, et. al., 2010).

In the next section, I take up the question of how excessive leverage in the financial sector has been used to enhance profits, and in Sect. III I discuss how leverage helps to generate asset bubbles.

II. "Shadow Banking" in the Financial System.

For the last three decades, the growth of activity in the "shadow banking system" has outpaced that of banks and other depository institutions, so that by 2007, assets in the shadow banking system had come to exceed those in the formal banking system by a wide margin.

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," he said, "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 tri-party repo grew to $2.5 trillion. Assets held in hedge funds grew to roughly $1.8 trillion. The combined balance sheets 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" (Geithner, 2008b).

Adrian and Shin (2009) report data from the Federal Reserve on some of the components of the shadow banking system, and compare it to data on bank-based assets. They find that at the end of 2007, bank-based assets totaled $12.8 trillion, whereas what they call "market-based institutions"

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had assets totaling $16.6 trillion.[21] Market-based institutions, as they use the term, means institutions that fund themselves by issuing securities (rather than by accepting deposits).

This matters because the market-based institutions that Adrian and Shin refer to avoid many of the regulations that apply to banks. Two types of regulations in particular that apply to banks are important for this story. The first are "reserve requirements," and the second are "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 determine what share of total assets must be financed with equity capital rather than with debt. 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 as much as they can of that money by making loans or buying securities, because they make profits by earning 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 to put a certain percentage of those deposits aside as "reserves," in the form of cash in the vault or as deposits banks make with the Federal Reserve banks. 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 come in and want to make a withdrawal. The amount that banks are required to keep in reserve is known as a "reserve requirement," and it is determined by the Federal Reserve. Since the reserve requirement is a fraction of total deposits, we have what is called a "fractional-reserve banking system."

The reserve requirement is important because it determines 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 stamping out coins and printing new bills, and it increases the liquid funds available to banks by buying Treasury securities from banks, giving them cash in place of the securities. 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. 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 he borrowed 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, say, into Bank C. Bank C thus receives $810,000 of new deposits, of which it can now loan out $729,000. The customer who receives the $729,000 again deposits it in some other bank, which can then loan out $656,100. Etc.

[21] These data suggest a ratio of assets of market-based financial institutions to bank asset of 1.3, which is close to the ratio I report in Fig. 2 of the ratio of shadow banking assets to bank assets. Data aggregated for the numerator of the ratio in Fig. 2 include the same five subsets of the financial sector that Adrian and Shin refer to as "market based institutions" and that others have called the shadow banking system.

When you repeat this process, the amount of money in circulation increases in a predictable way, forming an infinite series.

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

The total sum of this infinite series is $1,000,000/(reserve ratio), or in this case, $1,000,000/.1 = $10,000,000. In this way, 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 cash and reserves (cash plus bank reserves are called the "monetary base") it injects into the system, and by controlling the reserve requirement. In this simple example, $1,000,000 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, lots of people hold money outside the banking system, in the form of cash (in cash registers in retail stores, for example). The multiplier can work only on 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 mid-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.[22] But in normal times, the M1 money multiplier (the ratio of M1 to the monetary base) is about 1.9, meaning that for every dollar of cash and bank reserves that the Federal Reserve creates and injects into the banking system, banks create $1.90 worth of checkable deposits, so that M1 expands by 1.9 times the additional dollar (Krugman and Wells, 2009).

As should be clear by now, the Federal Reserve directly controls only the monetary base, but in practice, it also 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 resulted in many ways that people and businesses can hold financial assets, or spend money, without actually handling cash or even writing checks on checkable deposits. An individual may have a "home equity line of credit," for example, which enables her to borrow against the equity in her house, as needed. The homeowner could also arrange to make payments on the line of credit by setting up an automatic payment arrangement with her bank in which the bank moves 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

[22] The M1 money multiplier has been less than 1 since mid 2008, meaning that when the Federal Reserve adds a dollar of cash or reserves to the banking system, less than a dollar of new M1 is actually created. This is an example of a classic Keynesian "liquidity trap." Cite to St. Louis Fed.

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.[23] 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 securities in the "repo" market. 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, it is helpful 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 CDs. Throughout the last half of the 20th century (until 2006), the Federal Reserve also tracked an even broader measure called M3, which included large time deposits, institutional money market funds, and repurchase agreements ("repos"). And 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 what is sometimes called "near money," is that various forms of "credit" often serve as a substitute for money in the economy. While the Federal Reserve has significant influence over the narrow measures of money in the economy, it has much less influence over the supply of credit more generally, except through its influence on interest rates.

B. Leverage and the Supply of Credit.

As discussed above, financial innovation has now 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. In the last three decades, the supply of credit from outside the banking system has vastly outgrown the supply of money and credit made available by banks. This is clear from Fig. 2 above, which shows that since the mid-1990s, the ratio of shadow banking assets to banking system assets has exceeded 1. This means that more total credit is available now to the U.S. economy through the institutions that are outside the banking system, and generally very highly leveraged (finance companies, government-sponsored entities, mortgage pools, ABS issuers, and brokers and dealers) than through banks.

Although the creation of money by banks is constrained by the reserve requirement, the total amount of credit that banks and other financial institutions can create may be constrained only by the ability of these institutions to raise capital 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." Banks are restricted in their use of leverage by what are called "capital" requirements. 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). Another way to think of this is that the capital requirement determines how much shareholders' equity a bank must have,[24] or, conversely, how leveraged it can

[23] This is, in effect, how payroll deposit plans work.

[24] In the bank regulatory world, some kinds of long-term debt, and other instruments such as preferred shares may count as "capital". Thus, technically, capital in a bank may be more than shareholders' equity, but for our purposes here, it is sufficient to think of bank capital as the equity that the bank's shareholders have in the bank.

be.[25] 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 over the years and have not always been strictly enforced. Since 1974, the U.S. has participated in international efforts through the Basel Committee on Bank supervision, to coordinate capital requirements across countries. Under the so-called Basel I agreement, reached in 1988, internationally active banks in the G10 countries were supposed to hold capital at least equal to 8% of assets.[26] A subsequent agreement, Basel II, was reached in the late 1990s. This agreement substitutes a complex evaluation scheme for Basel I's flat minimum capital requirements, and relies on supervisory review as well as the hope that markets will provide some discipline, to rein in the amount of leverage a bank uses. Under Basel II, banking regulators often permitted banks to have significantly less than 8% of its assets in capital,[27] and in the U.S., most analysts regard the requirements under Basel II as significantly less constraining and more flexible than the Basel I requirements.

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 liquid assets to buy the house. Moreover, if the house goes up in value by, say, 5%, from $100,000 to $105,000, during the first year after the buyer moves in, he will have $15,000 in equity 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%, and a mere 10% decline in the value of the house would completely wipe out the homeowner's equity.

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 (or regulators) will allow them to use, so that they can invest as much as possible in those assets. Thus to improve their returns on capital, banks attempt to increase the amount of assets they manage, and services they provide, for any given level of 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 rise, its shareholders earn high returns. In fact, even a very small return on total assets for an 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 losses in the bad years do not offset the gains from leverage in good years for several reasons. First, if shareholders are diversified, and if failures of financial institutions are random, investors can diversify away some of the risk.[28] Second, shareholders in financial institutions are protected by the fact that in firms organized as corporations, shareholders have limited liability. This means that shareholders cannot be required to pay off debts of the firm if its debts exceed its assets. This, in turn, means that creditors bear some of the downside risk of high leverage, and shareholders will be better off if they can put more of the downside risk on creditors.

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[25] Ignoring the complexities of measuring "capital" in the banking system, the capital ratio plus the leverage ratio will always equal 1 by construction.

[26]

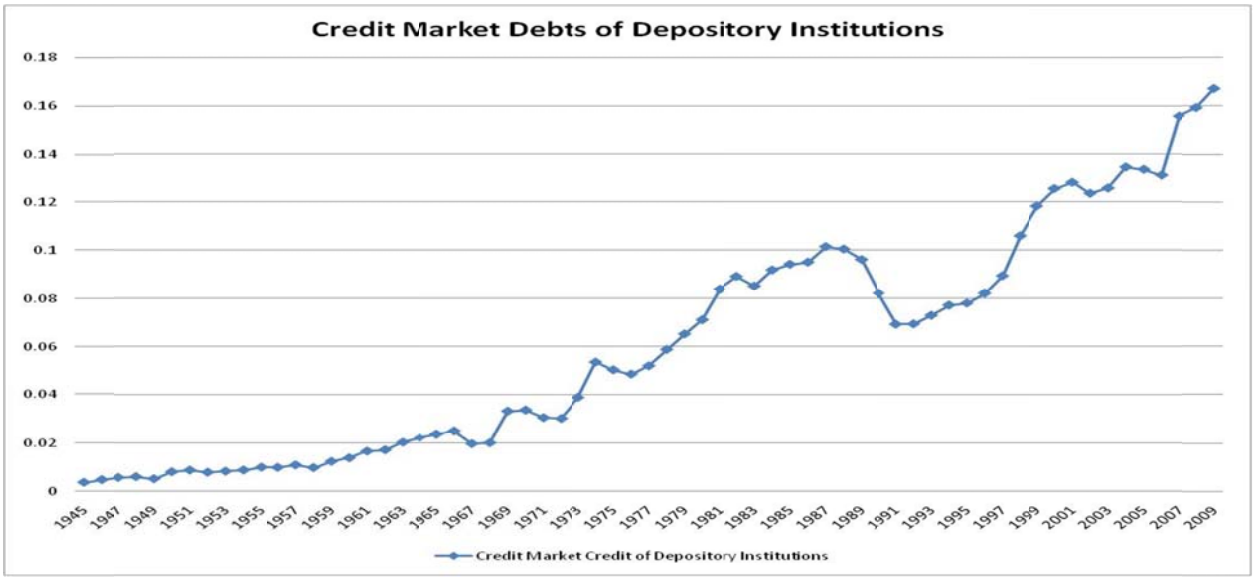
[27] The U.S. never fully implemented the Basel II capital requirements, but is participating in another revision and rethinking of international capital requirements post financial crisis through the Basel III process.

[28] The principle behind the idea of reducing risk through diversification requires that returns on the various investments in a portfolio are "random" or at least not correlated with each other. It turned out that investments in housing, while distributed across many geographic markets, price ranges, and credit risks, were highly correlated with each other, so that diversification within the category of housing investments did not eliminate or even substantially reduce default risk.

Finally, neither the financial firm, nor its shareholders "internalize" the externalities associated with financial crises, in which the financial failure of one financial institution increases the probability that other financial institutions will suffer losses.[29] I will say more about this in Part III below.

For these reasons, banks have financed a growing share of their total assets by borrowing in the credit markets, and other types of financial institutions have also ratcheted up their borrowing. Fig. 5 below measures the aggregate ratio of credit market debt to credit market assets of banks, savings institutions and credit unions (depository institutions). This ratio has climbed from less than 2% prior to the 1960s (when banks relied almost entirely on deposits), to more than 16% by the late 2000s.

Fig. 5: Reliance of Banks and Other Depository Institutions on Credit Market Financing.



Source: Authors' calculations from Federal Reserve Flow of Funds data, Table L.1, March 11, 2010. Credit market debt owed by the commercial banking sector (line11) divided by credit market assets held by the commercial banking sector (line 35).

Fig. 6 plots the total leverage (total liabilities divided by total assets) of U.S. depository institutions, and, separately, of the five shadow banking sectors used to calculate the data in Fig. 2. In this figure we see that the aggregate leverage of banks (depository institutions) has actually declined from what it was during the late '70s and early '80s, and is now somewhat below 90%.[30] 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 financial institutions have been able to reduce their reported leverage 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

[29] Brunnermeier (2008) calls this the "fire-sale externality."

[30] 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 into money market mutual funds which paid higher rates of interest See Part I above. Meanwhile, depository institutions, especially savings and loans and thrifts 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.

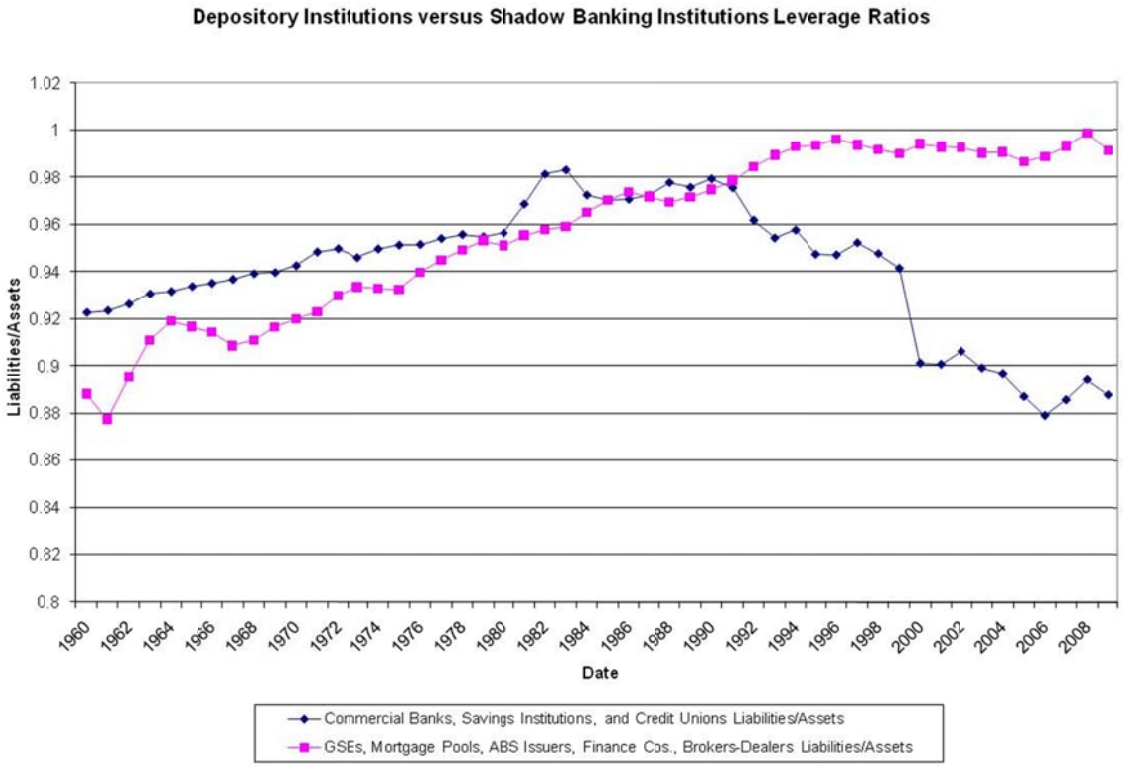
assets are now being financed by securities issued by so-called "special purpose entities," or "special purpose vehicles" (SPVs), or "special investment vehicles" (SIVs), or sometimes "conduits," created by banks, finance companies, government sponsored entities, and brokers and dealers (including investment banks) for the sole purpose of holding the assets and issuing the special securities (Achara and Schnabel, 2008; Stein, 2010).

Asset-backed securities, derivatives, and special purpose entities enabled banks and other financial institutions to create what Michael Simkovic (2009) calls "hidden leverage." "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 and creating an exaggerated appearance of creditworthiness. Simkovic (2009) reports that securitization could reduce interest rates by 150 basis points compared with a similar secured loan.

Federal Reserve Flow of Funds data account for some of this kind of financing through two new subsectors of the financial sector labeled "Mortage Pools," and "ABS Issuers."[31] "Mortgage pools" is a category that is really more like an accounting entry in the Flow of Funds data in that it has an aggregate leverage ratio of 1 by construction. ABS Issuers are separate legal entities, such as the "special purpose entities" mentioned 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, they are generally sponsored by big banks or investment banks which, for reputational and credit reasons stand behind the securities issued by the entities. If the entities fail (because the assets serving as collateral for their securities default), the big banks will often take them back onto their balance sheets. This happened repeatedly during the financial crisis (Stein, 2010; Acharya and Schnabl, 2008).

Fig. 6: Leverage Ratios of Banking (Depository Institutions), and Shadow Banking Sectors.

[31] These are two of the five sectors that were included as part of the shadow banking system for Fig. 2.



Source: Authors' calculations from Federal Reserve Flow of Funds data, March, 11, 2010. Tables L.109, L.114, L.115 were used for the leverage ratio of depository institutions, and Tables L.124, L.125, L.126, L.127, and L.129 were used for the leverage ratio of the shadow banking sector.

In Fig. 6, I aggregate the liabilities and assets of the five sectors that are key players in the shadow banking system and take the ratio to get a sense of the aggregate amount of leverage in the shadow banking system, we see that it is close to 1, and has been since the mid-1990s. Thus banks have been technically reducing their leverage, but a growing share of bank-like activity has been financed by shadow banking institutions. The effective leverage in the system as a whole remains about 94%. This implies a capital ratio of 6% for the combined system – the banking system plus the shadow banking system. This is substantially lower than the 8% capital ratio recommended under Basel I.[32]

III. 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, although, as noted before, regulators at both the national and international level have attempted to establish international capital standards for banks.

[32] This may also understate the amount of leverage that major banks and investment banks were using to the extent that "repo" transactions enable banks to temporarily sell assets, and add cash, for a few days at the end of each reporting period. In spring of 2010, investigators at the Federal Reserve Bank of New York found that at least 18 major banks were engaging in this practice during 2009 (Kelly, McGinty, and Fitzpatrick, 2010). Various insiders have reported that major investment banks and other players in the shadow banking system were operating with debt to equity ratios of 30 to 1 (96.7% leverage ratios) or more in the years leading up to the crisis (R. Johnson, 2010).

Leverage matters at the level of individual financial institutions for the reasons discussed, but it also matters for systemic reasons. Leverage adds riskiness to the economy as a whole because it magnifies spillover effects. 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. And if many banks are trying to sell asset at the same time as they all try to raise cash, this can drive down the prices those assets will receive in the market, magnifying losses for everyone (Brunnermeier, 2009; Krishnamurthy, 2010; Acharya et.al., 2008). Thus in a financial system in which most of the participants are highly-leveraged, a bad loan is highly contagious. Problems with one set of borrowers can spill over to other lenders and their customers. For this reason, the degree of leverage of any given institution may not truly be a private matter, between it and its investors, because there are social costs that may fall on outsiders when an institution is over-leveraged (Brunnermeier, 2009; Adrian and Brunnermeier, 2008).

Leverage also adds risk to the economy for another reason that has to do with what I will call the "credit multiplier" effect of leverage. To make this clear, imagine that we have a financial institution which I will call a "bank" that has a 25% capital requirement. 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 Fig. 7 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, say, 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/(capital requirement) times capital. With a 10% capital requirement, banks can finance assets worth 1/.1 = 10 times the dollar amount of capital. If financial institutions are allowed to operate with only 5% of capital (or less), however, those institutions can finance 20 or more times that amount of total assets.

Fig. 7. The "Credit Multiplier."

Panel A

25% Capital Requirement

Assets	Equity
$100	$25
	Liabilities
	$75

Panel B

10% Capital Requirement

Assets	Equity
$250	$25
	Liabilities
	$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 size of their balance sheets, one might ask where they will all be able to get additional loans to acquire additional assets and expand their balance sheets. If a financial system with a 10% capital requirement suddenly becomes a financial system with only a 5% capital requirement overnight, where would the additional debt capital and come from? And where would the additional assets come from to allow the whole system to expand its balance sheets?

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.).[33] Of course this sounds like nonsense because you would think that the banks in the aggregate cannot all make money if all they are doing is borrowing from and lending to each other.[34] So, in addition to simply buying each others' securities, 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 would be used to create new assets (such as to build new houses, or start new businesses). Thus a lower capital requirement in the system would probably lead to some expansion in the real economy.[35] 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.[36]

But if credit expands in the financial sector faster than the real economy can respond by creating new assets, some of the expansion of credit might be expected to encourage investors in the real economy to simply bid up prices of existing assets. A very rapid expansion of bank credit might, in fact, cause "asset bubbles" (Brunnermeier, 2009).

Thus we see that the capital requirement in a financial system, or its converse, the degree of leverage allowed in the system, works in a way that is analogous 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 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 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, the effects might be focused on the asset classes that are being financed by the new credit, thereby creating a "bubble." [37]

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[33] Haldane, et. al. (2010) show how two banks could securitize loans on their books, and sell each other the securities they create, so that each bank would end up more highly leveraged, but holding marketable securities rather than the underlying loans. The result would be that the regulators would require each bank to hold less in the way of capital to support those investments.

[34] In fact there is good reason to believe that a substantial part of the rapid expansion of balance sheets in the financial sector in the years leading up to the financial crisis was the result of institutions basically borrowing and lending to each other. Adrian and Shin (2010) observe that securitization allowed "banks and other intermediaries to leverage up by buying each others' securities." To be sure, a certain amount of trading 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 and others are for longer term. In a real economy, the financial sector can add value by matching parties who have surplus savings with parties who need cash, and trading securities until the relevant risks fall on those who are best situated to bear the risk. Of course institutions can also simply create and trade securities to collect the fees, or for the thrill of the gamble.

[35] Adrian and Shin (2010) suggest that leverage is the "forcing variable" in financial firms (rather than the passive outcome of investment decisions), and that financial institutions expand or contract their balance sheets to achieve the preferred leverage level.

[36] 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" (Bernanke, 2007), or the "credit channel".

[37] Geanakoplos (2010) identifies a different mechanism by which leverage might cause asset bubbles. When leverage is "loose," he say, investors can buy assets with only a small down payment. Asset prices will be driven up in this environment, he says, because optimistic buyers "can get easy credit and spend more." My arguments in this paper

The idea 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, should not be too surprising. As we have seen in the discussion above about substitutes for money in a modern economy, and about the various ways that the Federal Reserve measures the money supply and the various components of the money supply, there is really no bright line that separates what we call "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. At the next level, 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, in recent years, 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 not been well studied or appreciated among scholars in the fields of finance and macroeconomics.[38] One indication that this idea has been neglected is the very fact that the Federal Reserve, which is responsible for regulating banking, and which has a goal of encouraging full employment and preventing inflation, stopped measuring M3 in early 2006. At the time that it announced that it would no longer collect and report the data necessary to measure M3, the Federal Reserve issued a Statistical Release (2005) that announced this change, and explained merely 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." Yet M3 would have provided a useful 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. Yet, as Gorton (2010b) says, "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."

There are a few economists who have continued to estimate and report M3 since the Fed quit measuring it. Fig. 8 below was borrowed from the website of John Williams, who has made a living in recent years by collecting data and providing his own estimates of many statistics that the federal government estimates, such as inflation, GDP, and money supply growth. Here Williams reports the

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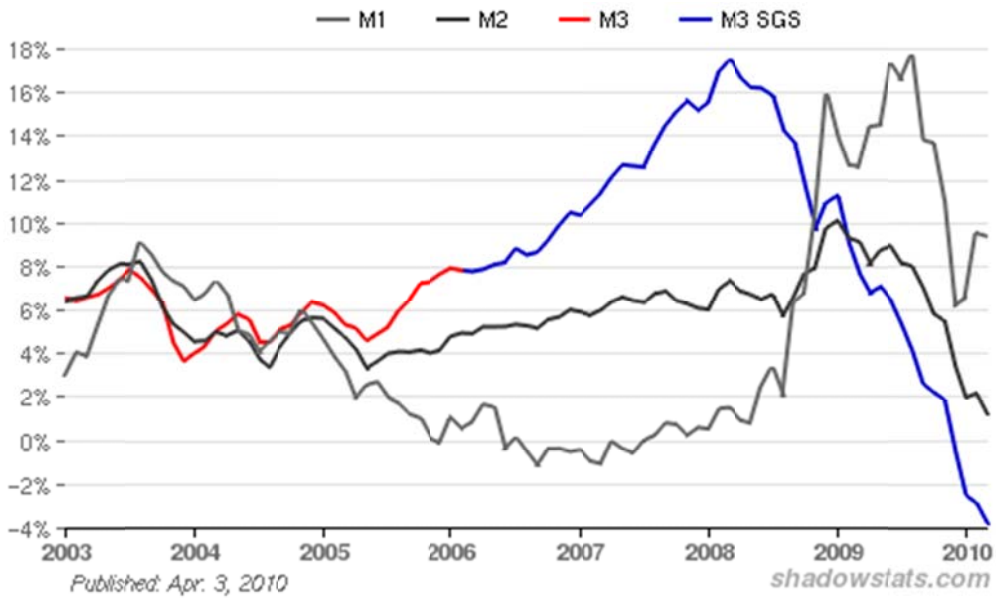
would end up in the same place if I adopted the Geanakoplos mechanism, but I adopt the money supply analogy because it helps make it clear where a general expansion in credit comes from.

[38] This idea is beginning to be explored among macroeconomists and macroeconomic policy makers, however. "In a market-based financial system, banking and capital market developments are inseparable, and funding conditions are closely tied to the fluctuations in leverage of market-based financial intermediaries," observe Adrian and Shin (2010b). These authors explain that prior to 1980, the literature on monetary policy focused on the relationship between monetary aggregates and the supply of credit in the economy, but "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, and is a measure of leverage.

Fed's measures of the annual change in M1, M2, and M3, with the Fed's M3 series ending in early 2006, and Williams' own estimates for M3 growth continuing after that through early 2010.[39]

Fig. 8. Annual U.S. Money Supply Growth – SGS Continuation



Source: John Williams, ShadowStats.com

These data suggest that M3 was growing at an explosive rate in the years and months leading up to the financial crisis. I suspect that the rapid growth rate was being driven by activity in the securitizations and "repo" markets, only some of which would have been picked up and measured even if the Fed had continued measuring M3. But far from not providing valuable information, M3 was at least pointing in the right direction. Rather than discontinuing M3, the Fed might have done better by continuing to measure M3, and beginning to collect and report a broader measure of money and credit that we might call M4 that would provide a much better window into activities in the shadow banking system.[40]

In sum, leverage matters because leverage determines the amount of new credit that financial institutions can create, and credit, like money (which are really the same things), provides the grease that keeps the economy humming. Supplying enough of that grease is important to a well functioning economy, but providing too much probably causes asset bubbles, or generalized inflation, or perhaps both. Excessive credit also exposes the economy to crashes when institutions decide they must reduce their leverage.

Without further research on the question, we do not 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

[39] I do not know if Mr. Williams' measure of M3 is correct, but other economists who have attempted their own measures of M3 report data that looks substantially similar. See, for example, http://blog.nowandfutures.com/.

[40] Gorton (2010b) seems to endorse this view also. "It is not only that M3 did not capture the right measure of money because it did not measure the full extent of the repo market, it is also that currently we do not know what the money supply really is either."

much. But we do know that the amount of credit has more than doubled relative to GDP 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 (Johnson and Kwak, 2010). During the same period, the supply of money as measured by either M1 or 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.[41]

IV. Excessive Credit and the Bipolar Economy

So far I have argued that a financial system that creates too much credit is likely to produce a real economy that is prone to asset pricing bubbles. We have lately experienced just how devastating the cycle of bubble and burst can be on the lives of most working people. As with bipolar disorder, the bubble part of the cycle feels good. Unemployment is low, wages are growing, more people are able to buy houses and take vacations, and government revenues are increasing which makes it possible to provide tax cuts, or more services that people want. But, also like bipolar disorder, the higher the high, the lower the low, and the harder the crash when it comes. Numerous articles and studies have documented the costs of the financial market crisis and worldwide recession of 2008-2009. The Pew Economic Policy Group Financial Reform Project, for example, estimates that 5.5 million American jobs were lost, and U.S. households lost an average of almost $5800 each in income from September of 2008 through the end of 2009 due to the decline in GDP. The stock market lost $7.4 trillion in that same period, and 500,000 more homes were foreclosed on in that period than had been predicted by the Congressional Budget Office just prior to the crash, in September of 2008 (Pew, 2010).

And these only measure effects in the U.S. Millions more jobs were lost overseas too. Unemployment at the end of 2009 was almost as high (9.9%) in the Euro area as it was in the U.S. at the same time (10%), and in some European countries such as Ireland, Spain, and several Eastern European countries the unemployment rate was above 12% at the end of 2009 (European Commission). The Asian Development Bank estimates that global financial assets, including stocks, bonds, and currencies, fell in value by more than $50 trillion in 2008, the equivalent of an entire year of global gross domestic product (Adam, 2009).

One reason that the crash has been so bad is that, when financial institutions get over-leveraged, the process of deleveraging is more painful the more overleveraged the institutions were in the first place.[42] This is due to the problem mentioned before, that when 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 banks are. To illustrate this with a simplified example, consider again the bank illustrated in Fig. 7, only now assume it has a ratio of debt to total assets of 98%.[43] This means its balance sheet would look like the following:

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[41] Author's calculations from Flow of Funds data, Table ____.

[42] In time series data for the U.S. economy, Adrian and Shin (2010a) observe that "financial crises tend to be preceded by marked increases in leverage and are subsequently followed by sharp deleveraging."

[43] There were rumors that numerous Wall Street firms may have been this highly leveraged at the beginning of the crash in 2008, and there seems to be widespread agreement that "haircuts" in the market for asset-backed securities (essentially the amount of down payment required to purchase the securities) were "on the order of 2%," according to Stein (2010). Geanakoplos (2010) presents data showing that the down payments required on subprime and alt-A mortgages in 2006 was only 2.7%. Krishnamurthy (2010) estimates that haircuts were generally 2.5% in early 2007.

Assets	Equity
$1250	$25
	Liabilities
	$1225

Here we see that our bank has total liabilities (including deposits) of $1225, which, together with the original equity capital of $25 supports $1250 in total assets, for a 98% leverage ratio. Now suppose that the assets consist of 25 loans, each with a payoff value of $50 each. And 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 $1200 in assets.

Once this happens, all of the shareholders' equity has been wiped out, and the bank is now insolvent – it has $1225 worth of liabilities, and only $1200 worth of assets. The bank is likely to default on one or more of its loans, or it might be unable to pay depositors their money if they show up to take their money out. If the bank is a traditional regulated bank, the Federal Deposit Insurance Corporation (FDIC), which provides a guarantee for depositors, might take over the bank. This might prevent depositors from making a run on the bank to get their money back.

But if the institution is not a regulated bank, but is part of the shadow banking system and is heavily financed with short term loans, such as repos, the various lenders to the institution are likely to get nervous, and they will not want to allow the bank to "roll over" or refinance its short term loans, or continue to borrow (Stein, 2010). Thus the institution will probably be forced to try to sell some assets so that it can pay off some of its loans and try to restore its balance sheet. But if numerous other banks and financial institutions are experiencing the same kinds of problems, they will all be trying to sell assets. This is likely to drive down the value of those assets in the market, so that the bank could find that it has to take another write down of its assets. A further write-down may mean that the institution defaults on more of its loans, which causes other banks to have to write down more of their loans to our initial bank. In this way, the crisis quickly spreads to other institutions. [44]

My point here is that, even if the banks and financial institutions in this economy were all merely lending to, and borrowing from each other, the whole system is more vulnerable to financial crisis the more leveraged all of its participants are. The decision that each financial institution makes about how leveraged it will be involves something of a prisoner's dilemma[45]: Each institution will be better off individually – more profitable on average – if it uses more leverage, but all of the institutions together may be worse off if the system as a whole is more leveraged. This is because there is likely to be less "systemic" risk in the economy as a whole if most financial institutions are not too 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, most institutions will not only be better off if they use higher amounts of leverage, they may also be better off if other institutions use more leverage – at least as long as price levels are still

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Haldane, et. al. (2010) report that "among the major global banks in the world, levels of leverage were on average more than 50 times equity at the peak of the boom."

[44] Stein (2010) calls this the "fire sale effect."

[45] A "prisoners' dilemma" is a game in which participants face a choice in which the strategy each would choose in isolation makes them both worse off, but if they can successfully coordinate their actions they can both be better off.

on their way up. This is because aggregate leverage, not just individual leverage, drives asset inflation, and rising asset prices tend to make the decision by an individual institution to use leverage look that much smarter after the fact. So if Bank A borrows $1225 to invest in $1250 worth of assets that are tied to housing prices (for a leverage ratio of 98%), Bank A will be more likely to make money on that investment if other banks are doing the same thing, and thereby causing housing prices to ratchet up. That $1250 bundle of housing assets may be worth $1300 next year, and Bank A now has $1300 in assets, and only $1225 in liabilities. Its equity capital has gone up by 200% to $75, and its leverage ratio has fallen to 94%.

But if the real economy can't add productive assets fast enough to feed the leverage monsters in the financial system, one would expect that the quality of the new investments being financed would tend to decline. This is in fact what happened (CITE). Why were portfolio managers were so blind to the developing bubble in the mid-2000s that they were willing to continue investing in securities that were tied to increasingly bad credit risk mortgages. The answer illustrates further the dangers in the lack of control over leverage. As housing prices were going up, financial institutions were continuously revaluing their portfolios upward, but instead of allowing increasing asset values to cause their leverage to decline, the higher portfolio values drove them to seek out even more investments. If Bank A's portfolio value rises to $1300, so that its equity capital is now $75, this $75 will now support a balance sheet worth $3750. Adrian and Shin (2010b) describe this phenomenon as the "imperative to find new assets to fill the expanding balance sheet."[46]

While operating with high leverage ratios is attractive in a rising market, it is deadly if market prices begin to fall. Once an asset bubble peaks in a highly leveraged economy, all of the machinery that was driving the expansion of leverage and expansion of credit and encouraging additional spending on the assets that were rising in value on the way up, goes into reverse. Now when Bank A defaults, the effects rapidly ripple out to other institutions.

In this way, even if all participants in a market economy are rational, if leverage is not regulated and limited, the financial sector will tend to employ too much leverage. Other things being equal, excessive leverage, in turn, is likely to promote boom and bust cycles in the real economy. As Robert Solow (2009) puts it "It is leverage that turns large banks and financial institutions into ninepins". 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 did nothing any more sinister than take jobs in the booming sectors of the economy. When the bust part of the cycle hits, individuals at the margins of the labor market – minorities, those with low skills, new high school graduates and college graduates who were not employed before the crash and thus have very little experience, and even older people who work in parts of the economy such as tourism that depend heavily on surplus disposable income – tend to bear the brunt of the decline in economic activity.

Meanwhile, individual bankers, traders, brokers, and other financial intermediaries who helped to create the bubble, may, by contrast, be better off in a bipolar 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

[46] As Citibank's executive Chuck Prince put it, "When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance." Nakamoto and Wighton, 2007, as cited in Nesvetailova (2010).

employees to get paid enormous sums of money during good years, without having to pay back that money in bad years.[47]

V. Asset Bubbles Drive Excessive Compensation in the Financial Sector

The financial sector has grown substantially as a share of total GDP in the U.S. from about 5% in 1980 to around 7.5% in 2008.[48] And people who work in this sector have enjoyed much faster growth in compensation than the average person in other parts of the economy for the last three decades. Compensation per employee in finance has gone from about $20,000 per year in 1980 to nearly $100,000 per year per employee (including secretaries and clerks) in recent years. Here I hypothesize that both of these trends are, at least in part, a product of the tendency of the financial sector to operate in ways that generate asset bubbles.

We begin by noting that the compensation paid to people who work in the finance sector of the economy is part of the "transactions costs" associated with managing financial assets and channeling savings into productive investments (Philippon, 2008). If financial wealth had grown dramatically relative to total wealth, it might at first not seem surprising that the amount of money paid out for managing that wealth has grown relative to GDP. But financial wealth has grown only modestly in recent decades relative to total wealth.[49] Moreover, consider that many of the components of total transactions costs – especially information costs and computational costs – have fallen dramatically in the last 30 years. Thus one might expect that the cost of providing the same services that the financial sector provided in the past, while having grown in absolute terms, might have declined over the last 30 years as a share of total income or total wealth. Indeed, this has happened to some degree in the some parts of the financial sector. In the mutual fund industry, for example, as more funds eschew stock picking and timing and instead follow an index fund strategy, fees have declined from an average of 2.32% of assets under management for stock funds in 1980 to 1.13% in 2005. For bond funds, fees have declined from an average of 2.05% in 1980 to 0.90% of assets under management in 2005 (Kaplan and Rauh, 2007). Despite declining as a share of assets, the total fees paid to mutual funds, however, grew from $1.3 billion in 1980 to $73.1 billion in 2005 because the value of assets under management has grown so much.

Fig. 9 shows that the "output" of the financial sector has grown from around 5% of GDP in 1980 to around 7.5% of measured GDP in 2008, although this appears to be a continuation of a trend that goes back at least to 1945.

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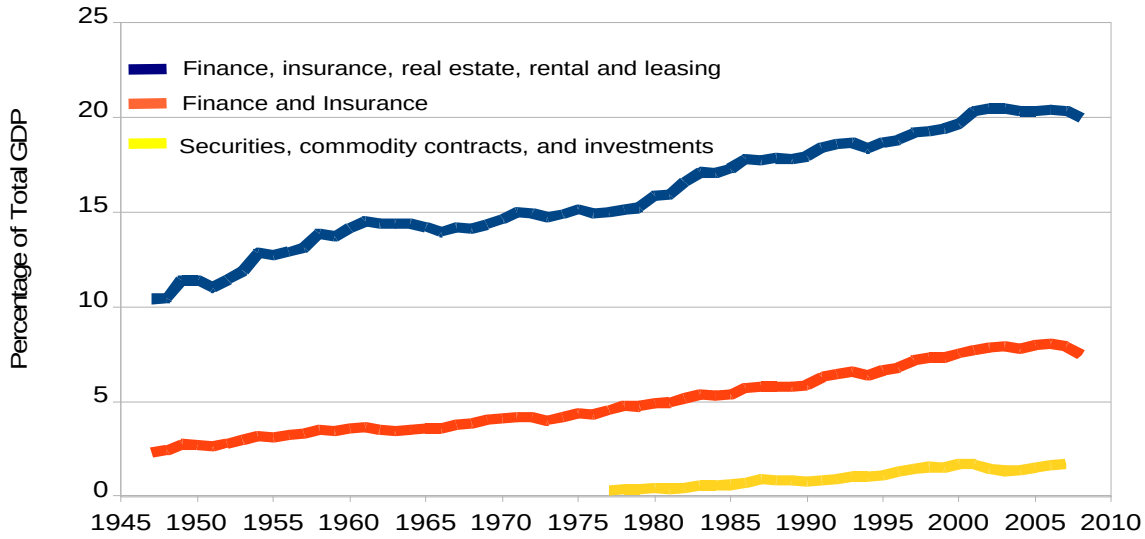
[47] Solow (2009) similarly argues that "extreme leverage is what generates extreme uncertainty and systemic risk. And it also encourages the dangerous compensation practices Posner pillories. Leverage allows a clever player to manage enormous sums; it is then irresistible to focus on the short run and skim off mind-boggling paychecks and bonuses before the opportunity goes away."

[48] Finance has grown relative to GDP in other countries as well (Haldane, Brennan, and Madouros, 2010).

[49] Financial assets as a share of total household net worth ranged from about 68% to 74% from 1946 through 1994, but climbed out of that range in the 1990s, and reached 78.8% in 2007, and 83.2% in 2009. The jump up in the ratio in the last few years is probably the result of the decline in housing values during the recession, even as government debt rose significantly. Flow of Funds, Table B.100, Balance Sheet of Households, line 8 (Financial assets) divided by line 42 (Net worth).

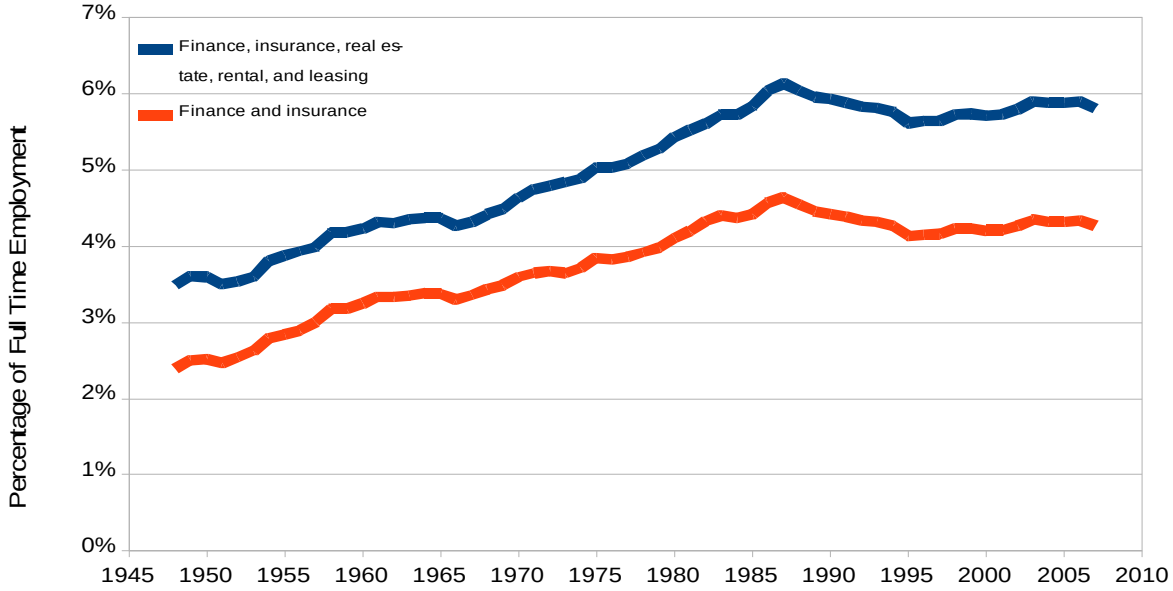
Fig. 9. Share of GDP in Finance



Source: NIPA Tables and author's calculations.

In Fig. 10, we see that the share of total employment in finance, after growing steadily from 1945 to 1985, has not continued to grow since the mid-1980s. In other words, the delivery of financial services requires roughly the same share of the workforce as it did in the mid-1980s.

Fig. 10. Share of Employment in Finance

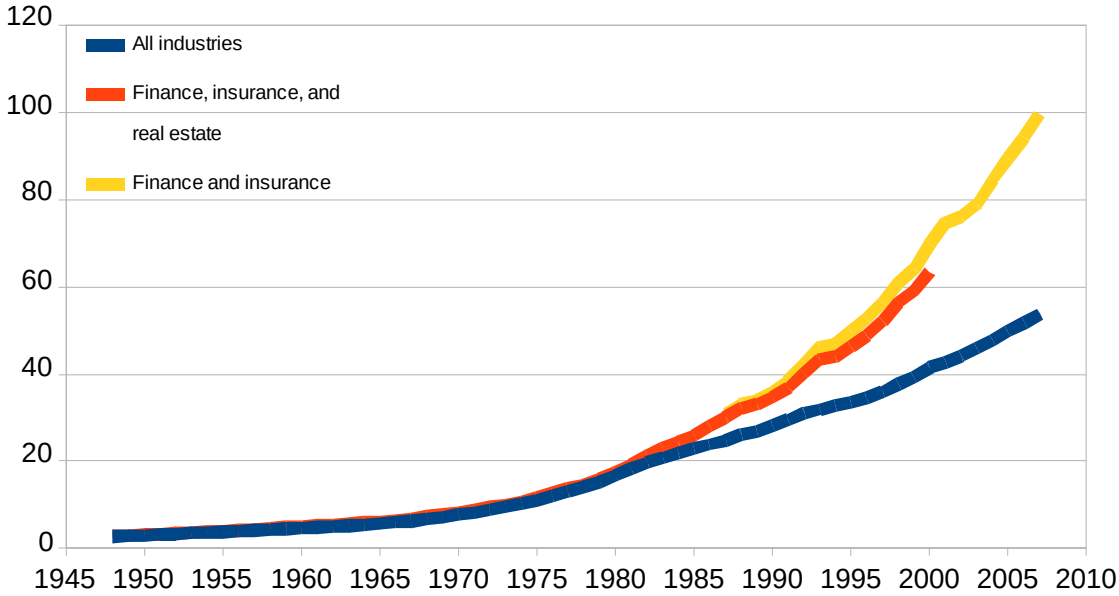


Source: NIPA Tables and author's calculations.

This suggests that compensation per employee in finance has probably grown substantially, which it has. Fig. 11 shows that compensation in the broadly defined finance sector (including real estate) began growing faster than compensation in the economy as a whole around 1980. By the late 1980s, compensation in the subset of finance that includes finance and insurance only (not real estate) began growing even faster. By the mid-2000s, compensation per employee (including clerks and secretaries) in the securities and commodities sector (which includes investment banking) had

reached six figure territory. Philippon (2009) estimates that in 2007, the bonuses alone on Wall Street exceeded $200,000 per employee.

Fig. 11. Compensation per Employee – Finance and All Other



Source: NIPA Tables and author's calculations.

The acceleration in the growth of incomes in the financial sector relative to the rest of the economy corresponds in timing to a dramatic widening of the income distribution in the U.S. that also began in the 1980s. Piketty and Saez (2003) have documented that across the economy, incomes have grown much faster at the upper reaches of the income distribution since the 1980s, and that upper income earners have captured a growing share of total income in the U.S. They show that at the end of World War II, the top 1% of income earners earned about 10 to 12% of all income, and this continued until 1952, when the share of the top 1% dropped below 10%, and stayed at about 10% or less until 1988. After that, the share of the top 1% began climbing steadily, reaching 23.5% in 2007, almost up to the previous high of 24% in 1928 (Saez`, 2010). In 2008, the share of the top 1% fell a bit, but Saez (2010) shows that from 1993 through 2008, the top 1% of income earners captured 52% of all the income growth for the whole economy. Within the top 1%, the distribution also widened, so that the top .01% captured a growing share of the income of the top 1%, also peaking in 2007.

The correspondence between the increase in the share of GDP accounted for by finance, and the increase in the share of income captured by the top echelons of income earners does not, of course, prove that the former explains the latter. Kaplan and Rauh (2007), however, attempt to estimate the proportion of individuals in the highest income brackets in the U.S. that are employed in the finance sector. They observe that it has become common in investment banks that many individual traders, partners, and other executives are very highly paid.[50] Through a complex estimation process they estimate that about 10,000 top-tier managing directors at investment banks received enough pay in 2004 to place them in the top brackets of income earners in the U.S., and that, collectively, investment bankers alone may have accounted for as much as 6 to 11% of the top 0.01% of the

[50] Anecdote about number of people who worked for Goldman Sachs in 2007 who were paid more than $1 million in bonuses for that year.

income distribution in that year (Kaplan and Rauh, 2007). This measure does not include highly paid employees of other categories of financial firms, which would presumably add thousands of additional individuals from banks, hedge funds, mortgage brokers, and other financial firms, who are paid enough to put them into the top income brackets.

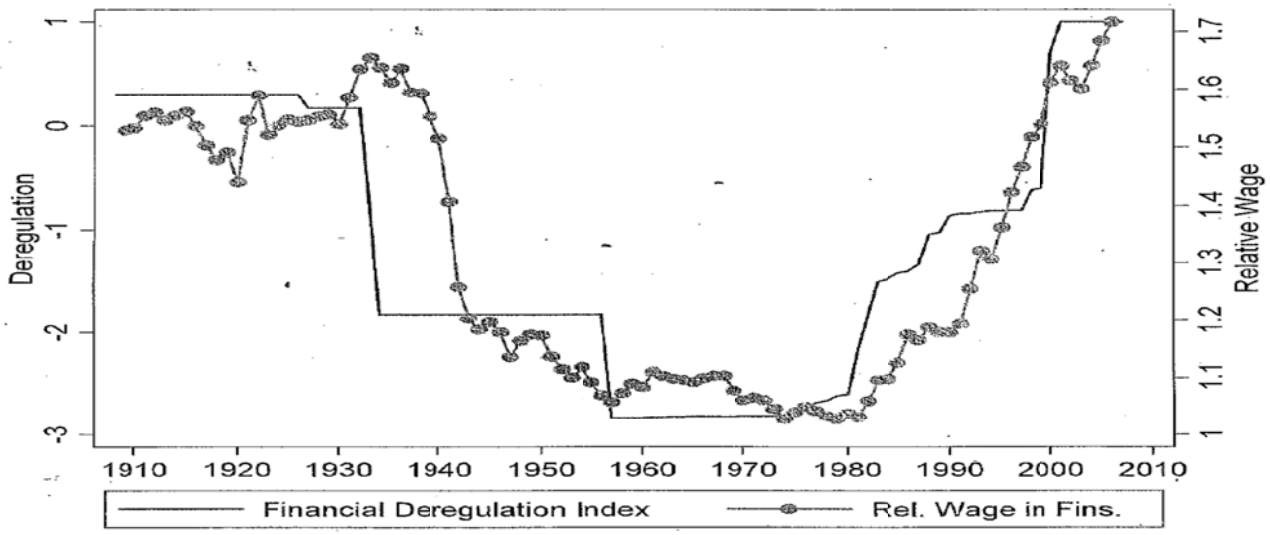
Thomas Philippon and Ariell Reshef (2009) have done the definitive work explaining the high compensation of levels of people who work in the financial sector. They assemble data on wages, education, and occupations from 1910 to 2005, and show that the financial sector of the U.S. economy employed people with substantially higher levels of education on average than in the rest of the economy in the period from 1910 to 1930. Then average education levels in finance dropped to levels much closer to the economy-wide average in the early 1930s, and stayed there until 1980. After 1980, the average education level in finance once again rose back up past where it was relative to the rest of the economy prior to 1930, and has continued to climb. Since the early 2000s, financial firms have had almost twice the share of employees with more than a high school education than is found in the rest of the economy. Philippon and Reshev (2009) show that, like education levels, compensation in the financial sector relative to compensation in the rest of the economy has also exhibited a long U-shaped pattern in which it was quite high in the period prior to 1930 (more than 1.5 times the level of the rest of the economy), dropped after 1930 to levels no more than about 10% higher than the rest of the economy, and then climbed back up after 1980 to as much as 1.7 times pay levels in the rest of the economy.

Using regression analysis, Philippon and Reshev demonstrate convincingly that the higher education and skill level in the financial sector prior to 1930 and after 1980 correspond to periods when initial public offerings for new businesses were especially frequent. They hypothesize that greater skill is needed to assess credit-worthiness of new businesses and to price credit instruments issued by new businesses than is needed to price the risk of other securities such as government bonds. Thus, in periods when corporate finance activities dominate the financial markets, the financial sector has employed more highly educated people. Regression analysis supports this hypothesis, but makes it clear that this does not explain the whole pattern.

Phillipon and Reshev also hypothesize that the returns to education and skills in the financial sector are likely to be much higher in periods when finance is not highly regulated than in periods when it is highly regulated, because, in the latter periods, there is less room for innovation. The authors construct several indices of financial regulation and show that these indices are highly significant in predicting the relative education level, and the relative wage level in finance. One figure is especially telling. Fig. 12 below is borrowed from Figure 6 in Philippon and Reshev (2009). This shows that when the financial deregulation index drops in the early 1930s as a result of the imposition of an extensive regulatory structure for finance during the Great Depression, within a few years, the relative wage paid in finance also drops, and that when finance is deregulated in the years from 1980 to 2000, the relative wage climbs back up to new highs.

Fig. 12. The Relationship between Wages in Finance and Deregulation.

Figure 6: Relative Financial Wage and Financial Deregulation



Source: Philippon and Reshev (2009), Fig. 6.

Philippon and Reshev conclude that education can explain most of the higher pay in finance prior to the 1980s, but that since 1980, the pay for financiers has risen substantially beyond the level that can be explained by higher education. The authors also show that the higher pay in finance cannot be explained by higher risks associated with working in finance, nor can it be explained by unobserved characteristics of the people who work in finance. Thus they ultimately conclude that economic "rents" "account for 30% to 50% of the wage differentials observed since the late 1990s" (Philippon and Reshev, 2009).

The idea that financiers are capturing "rents" leads naturally to the question of where the rents come from in finance. Since finance is a transactions cost, for financiers to capture "rents" of such magnitude implies that there are considerable inefficiencies involved in the provision of financial services. One source of such rents could be economic power that providers of financial services have relative to their suppliers or customers, but presumably it would be difficult for financial institutions to sustain their market power over time if there were a large and growing number of firms in the market. Houston and Stiroh (2006) report the number of firms in each of four sectors within finance (commercial banks, savings institutions, insurance firms, and other financials) for the time periods 1975-1984, 1985-1994, and 1995-2005. In each subsector, the number of firms grew significantly over time, with the total for the sector growing from 423 firms (on average) in 1975-1984, to 1026 firms in 1995-2005. Although the financial crisis resulted in some consolidation, there are still hundreds of banks and other financial institutions operating in the U.S., and even the largest banks also face competition from international firms as well as from institutions in the shadow banking system. Nonetheless, further work should perhaps done to determine whether banks have been able to charge higher than competitive market prices for their services in recent decades.

Do financial market firms perhaps control some scarce resource or intellectual capital? Large amount of resources are undoubtedly expended by individuals and firms in the financial markets in

attempts to gain an information advantage, or a computing advantage, or a trading advantage,[51] but analysts repeatedly find that financial markets are efficient enough that investors are rarely able to "beat the market" more often than might be expected as the result of pure chance. Moreover, Philippon and Reshev (2009) find very little evidence that neither of two measures of technology, information technology (IT) intensity (the share of IT and software in the capital stock of the financial sector), or financial patents, help explain relative wages in finance, though financial patents do appear to help explain relative levels of education among financial industry employees.

So what could be the source of the rents that have made it possible to pay the people who work in the sector so much more than they could expect to earn with the same education and skills in some other sector? To answer these questions, it might be helpful to know how much value the financial sector provides to the economy as a whole. Unfortunately, the data on the contribution of the financial sector to GDP is not very helpful in answering this question. This is because, in the financial sector, there is no independent measure of the value of what is created. Moreover, there is no agreed-upon unit of output in the industry, such as the number of cars or trucks in the automotive industry. Economists who compute the national accounts essentially measure the value added by finance as the difference between the interest earned by financial firms, and the interest those firms pay their investors, plus revenues from specific fees charged for services (Triplett and Bosworth, 2004).[52] In other words, the value of the output of finance is, by definition, assumed to be the same as the value that is captured by the finance sector. This means that our measures of the value that is added by the services that finance provides can't be cleanly separated out from the economic return on the capital that the finance sector is using or managing. While the economic return on assets under management in finance includes some implicit provision for services that are not directly priced, it also includes some allowance for risk. But our measures of the value added to GDP by finance are not adjusted for risk. This means that the measured value added will be larger when the financial sector invests in a risky way so they earn a higher rate of return (Wang and Basu, 2005; Haldane, et.al, 2010).

The possibility that the higher returns to finance in recent decades is little more than compensation for higher risk is consistent with the theory I propose here, which is that financiers and shareholders of financial firms have earned "rents" because the apparent returns in the business have been exaggerated by extraordinary levels of leverage.[53] One might expect that if returns are high due to taking higher risks, those returns should show much higher variance, and should occasionally lead to substantial losses. Indeed, this has happened. Houston and Stiroh (2006), for example, show that the variance of returns in the commercial banking sector increased by 74% from the 1975-1984 period to the 1985-1994 period. After that, their measure of variance leveled off at the higher level in the period 1995-2005. This latter period, as we showed in Fig. 6 above, corresponds to when the

[51] See, e.g., Patterson (2010) ("Superfast Traders' New Edge: Investment Firms Grab Stock Data First, and Use It Seconds Before Others," Wall Street Journal, June 4, 2010, p. C1.)

[52] Part of what the financial sector earns, is, of course, paid out to the people who work in the sector in wages, and economists also generally assume that the people who work in finance contribute value equivalent to what they are paid (Philippon, 2008).

[53] Haldane, et. al. (2010) find that "virtually all of the increase in ROE of major UK banks [since 2000] appears to have been the result of higher leverage. Banks' return on assets – a more precise measure of their productivity – was flat or even falling over this period." The higher returns to the financial sector in recent decades (as measured by contribution to GDP), they argue, is "likely to have been an act of risk illusion."

banking sector was bringing its measured on-the-books leverage down, as more and more of the risks were moved off-balance sheet, and into the shadow banking sector

Financial firms, their investors and their employees have an incentive to take on greater risk via greater leverage because the incidence of returns and losses, from their perspective, is not symmetric. Firms get high fees, employees take home huge bonuses, and shareholders get dividends in good years, when portfolio values rise, but they rarely have to give back any previously paid dividends or compensation when portfolio values decline. The downside risk falls on others, including creditors, and even, as we have seen, taxpayers.

Since 2007, trillions of dollars of nominal value have been lost on financial assets. To the extent that this is a correction to a pricing bubble in financial assets, this strongly suggests that the compensation paid in the financial sector was higher during the bubble years (and maybe throughout much of the last few decades) than it should have been in some sense – higher than it would otherwise have been if the assets being managed were not being artificially inflated in value by excess leverage.

VI. Conclusions.

I have argued that the most important financial reform that regulators need to incorporate into their rule-making as they implement the 2010 Dodd-Frank 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.

The problems with excessive leverage are manifold:

1) Financial firms that operate with excessive leverage, especially if it is disguised so that their trading partners and their regulators cannot see it clearly, pump up their return on equity, without improving the underlying return on assets. This is especially true when portfolio values are generally rising.

2) At the firm level, financial firms have incentives to use too much leverage because employees and managers of the firms do not bear the full costs of the risks associated with the leverage.

3) At the macroeconomic level, when a large number of financial firms ramp up their leverage at the same time, they may, collectively, pump excessive credit into the economy. Excessive credit acts like a monetary stimulus to the sectors of the economy where the credit flows, leading to asset pricing bubbles.

4) Asset bubbles, in turn, can lead to sudden and catastrophic crashes, when the swelling prices of the assets in the bubble cannot be sustained. When asset prices peak, the most highly-leveraged firms are the most vulnerable because a small decline in prices can wipe out their capital, and force firms to sell assets. But forced sales of assets will very likely lead to further asset price declines, which in turn leads to more asset sales. This “fire sale” effect can cause massive losses to others who were not even a party to the original transactions that got into trouble. Asset bubbles and crashes can be extremely costly to the whole economy – a cost that is not internalized by the financial institutions that took on the leverage that led to the bubble and crash cycle.

5) Bubble and crash cycles, however, can be quite lucrative for the financial market participants who help to create them. This is because of the asymmetric nature of the gains and losses – financiers and shareholders of financial firms take home sizeable wages, bonuses, and

dividends in good years, but are not required to pay these back in bad years. For this reason, financial markets will not be self-correcting and self-regulating.

6) The effect of repeated bubble and crash cycles in the economy has been a steady ratcheting up of compensation in the financial sector, which has exacerbated the trend toward ever widening distribution of wealth and income in the U.S. In fact, the growing wealth of the financier class might be self-perpetuating because their high wages and astronomical bonuses gives them significant political clout. The Center for Responsive Politics, a non-profit, non-ideological organization which collects and tracks data on the role of money in politics and makes the data available to the public on its website, notes, for example, that "the financial sector is far and away the largest source of campaign contributions to federal candidates and parties, with insurance companies, securities and investment firms, real estate interests, and commercial banks providing the bulk of that money."[54]

Thus, if financial firms and financial markets are not 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 a growing share of society's resources is captured by finance. Addressing this issue, and heading off this outcome, may be the single most important thing that financial regulators do as they go about the task of implementing financial market reform.

[54] See OpenSecrets website at http://www.opensecrets.org/industries/Indus.php?ind=F.

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