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The World of Shadow Banking:

An examination of non-bank financial intermediaries
and their contribution to the 2008 financial crisis.

By:
Colin Applewhite

A thesis submitted to the University of Mississippi in partial fulfillment of the
requirements of the Sally McDonnell Barksdale Honors College

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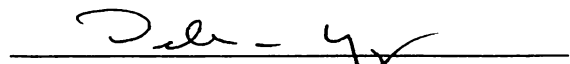
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Abstract

Since its rise in the second half of the twentieth century, shadow banking has grown to overtake commercial banking in the financial sector. The health of the economy now relies heavily on the sustainability of shadow banks, as seen with the financial crisis of 2008. This thesis will examine exactly how shadow banking became such a vital component to the economy. It will look at the history of the financial system that was conducive to the growth of shadow banking, with an emphasis on the Banking Act of 1933. Further, it will discuss key financial instruments that are the backbone of shadow banking operations, specifically those that contributed to the banking panic of 2007. It will show that the banking panic of 2007 was the result of a series of runs on systemic financial institutions, which had a similar effect as the bank runs of the Great Depression.

I. Introduction

In the wake of the 2008 global financial crisis, Wall Street came under heavy scrutiny for its actions that nearly unraveled financial markets across the world. Financial institutions have been bombarded with lawsuits alleging security fraud and deception of both investors and the government. Historically, the government has kept the financial sector somewhat regulated to assure the public of the safety of their assets. However, critics argue that this regulation can prevent financial institutions from achieving their full potential of higher returns. To counteract regulatory restraints, an evolution of financial intermediation took place — an adaptation of the financial market that operated in the “shadows” of traditional banking that included institutions such as entire investment banks, money market funds, and credit hedge funds.

Economies function through borrowing and lending. Individuals borrow for personal reasons such as car loans, mortgages, or student loans for college. Companies might borrow to jumpstart their growth, fund everyday operations, or purchase plant and equipment. In a direct lending market, these individuals and companies must seek funding directly from savers, who in turn have the responsibility of evaluating the risk and creditworthiness of the borrower. However, a direct lending market is not ideal, since the costs and time invested is enormously high (Noeth B., 2012). Traditional banking serves the purpose of financial intermediation – a middleman that matches those who need credit with those who are willing to lend their money.

A capitalistic society is known for fierce competition. If one company is successful with a certain product, a new company will enter the market with a similar product, hoping to poach the already successful company's customers. The banking world operates similarly, with the introduction of shadow banking analogous to that of a company entering the market to compete with the existing firm. Offering financial intermediation similar to that of traditional banks, shadow banks are usually highly leveraged institutions that operate using instruments such as asset backed mortgages (ABS), collateralized debt obligations (CDO), and repurchase agreements (Repo) (Poszar, Adrian, Ashcroft, & Boesky, 2010).

The role of traditional or commercial banking as a foundation of the economy is well documented and will continue to be as long as there is a need for capital by those who do not have it. The advancement of technology and continuous attempts to offer the best product have allowed the shadow banking sector to not only evolve into a large, significant part of the economy but also one that holds that health of the economy in the palm of it's hand.

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II. The Great Depression: The foundation of shadow banking

The Roaring Twenties

In order to gain a clear understanding of the history of the shadow banking system and its evolution in the United States, one must delve as far back as the Great Depression to assess the financial system prior to the shadow banking evolution. If there is a universal theme to the financial crisis of 2008, it is that history tends to repeat itself, and there are in fact, many similarities between the Great Depression and the “Great Recession.” There is a reason that financial crises transpire, and it is not by accident or a random sequence of events. Similar to the period before the recent crash in 2008, the period prior to the Great Depression was one in which the financial sector saw little regulation during a time of extreme economic growth – a period known as the Roaring Twenties.

The rapid growth in the 1920’s was propelled by massive technological advancement and increases in wealth, finance, and debt (Acharya, Cooly, Richardson, & Walter, 2011, p. 13). Government growth policies assisted the rapid consumer spending on new technological goods such as the automobile. Millions of people began paying for these goods on installment payments; it was a new “form” of credit that made buying goods much easier. When credit was so readily available, people began to, unsurprisingly, spend much more than their income levels allowed, and had more obligations than they could handle. Households were struggling to pay off debts and resorted to throwing money, much of which was borrowed, into

the stock market to try and supplement their income. Due to overwhelming speculation, the market continued to rise, and the prices of stocks were driven to record levels. Companies displaying their new technological advancements created immense excitement for investors, who embraced the chance for risky high-yielding returns (Neal & White, 2012). Unfortunately, most investors were not fully aware of the risk being undertaken, until the crash in 1929, when billions of dollars of wealth disappeared in a day. It is generally accepted that the stock market crash was not explicitly responsible for the Great Depression but was instead more like the ignition switch that started it. By the end of 1929, the Dow had recovered to within a few percentage points of its record peak (Scardino, 1987). Perhaps an even greater consequence of the stock market crash in 1929 than the decrease in wealth was the fear it instilled in consumers towards the health of the economy. Consumers and firms were forced to curb their spending, which crippled the economy.

While the extent to which Black Tuesday facilitated the onset of the economic depression is still argued, one contributing factor of the depression that is universally agreed upon was the collapse of the U.S. banking system. In the 1930's, there were a series of banking panics in which depositors withdrew their money, fearing their banks would fail like the hundreds before them (Wheelock, n.d.). One of the defining qualities of a bank is the capability of maturity transformation. That is, in simple terms, borrowing short and lending long. One way banks borrow is with customer's deposits, which are liquid, short-term debt securities that the customer can withdraw at any moment based on his or her own needs. These deposits are

tied up in illiquid, long-term loans that can not be recovered in the case of a mass withdrawal request from customers. Of course, this form of transformation is only successful when depositors are willing to let their savings sit in the bank. When depositors begin to question a bank's solvency, or when other banks start to fail, the rational action is to withdraw deposits from the bank. Such was the case in the late 1920s and early 1930s, and the catalyst for one of the most important pieces of banking legislation in history.

Banking Act of 1933

After the stock market crash of 1929 that "triggered" the Great Depression, the federal government conducted several investigations to expose the causes of the crisis and its overwhelming systemic risk. It was concluded that a large determinant of the crisis was commercial banks' creation of an immense and indefensible credit bubble due to careless and even fraudulent loans (Wheelock, n.d.). As previously stated, once the stock market crashed, consumers were struggling to pay off their debts, leading others to panic and immediately pull their money out of banks. In this situation, the panic is the result of an incoming recession in which depositors need their savings to spend in case of unemployment or wage cuts. Obviously, individuals were fearful of their job securities and as a result, withdrew deposits from their banks. The only people who precisely grasped the financial strength of certain banks were those who worked inside them (Gorton G. B., 2010, p. 4). The reaction sent the economy into a downward spiral due to the banks lacking the

required reserve capital while simultaneously carrying high default rates on speculative loans. More than 4,000 banks closed from 1929 to 1932, taking depositors' money with them (Acharya, Cooly, Richardson, & Walter, 2011). As a result, the government concluded that stringent regulation of commercial banking was necessary. Several changes needed to be made, so the Banking Act of 1933 was enacted to authorize these regulations and to keep the financial system stable.

This legislation, composed of several parts, aimed to steady the ship that had been capsized. According to Acharya, Cooly, and Richardson, the Banking Act of 1933 focused on three regulatory responses to market failure:

1. *Identify the market failure* – why the collective outcome of individual economic agents and institutions does not lead to socially efficient outcomes, which in this case reflected the financial fragility induced by depositor runs
2. *Address the market failure through government intervention* – in this case by insuring retail depositors against losses.
3. *Recognize and contain the direct costs of intervention, as well as the indirect costs due to moral hazard arising from intervention* – by charging insurance premiums for deposit insurance, restricting them from riskier and more cyclical investment banking activities, and orderly resolution at an early stage of distress.

(Acharya, Cooly, Richardson, & Walter, 2011, p. 2)

For the purpose of this thesis, however, two key components of the Act are discussed: deposit insurance and the restriction of investment banking activities. First, to keep bank reserves high and to allow for banks to confidently provide loans to borrowers, a method of reassurance was needed in order for depositors to feel secure about the safety of their money, even in the event of a banking panic. Banks were susceptible to panics whether systemic risk was real or imagined. Depositors have a natural inclination to believe that if a few banks begin to fail in the midst of a looming recession, then other banks also will struggle. In response, Senator Henry Steagall proposed the integration of the Federal Deposit Insurance Corporation (FDIC). Essentially, the government promised depositors that it would insure all of their deposits up to a certain amount if the depositor's bank was an FDIC member.

However, there was still a potential problem that banks would make speculative investments using FDIC deposits and take advantage of the safety net. With the rapid growth of the economy experienced in the 1920's, banks and consumer credit were forced to evolve in order to support the growth. Large banks, such as National City Bank (now known as Citibank) and Chase Bank, were offering the best of both worlds – services that dealt with security transactions while also offering traditional products like deposits and loans (Rickards, 2012). Judge Louis Brandeis warned in a collection of essays in 1914, titled *Other People's Money and How the Bankers Use It*, that multifunctional banking would not be beneficial to market competition due to conflicting interests. He argued that with a multifunctional bank comes a large client base and that these clients would have overlapping interests. He later gives an example, asking “can there be real

bargaining where the same man is on both sides of the trade? The investment banker, through his controlling influence on the Board of Directors, decides that the corporation shall issue and sell securities, decides the price at which it shall sell them, and decides that it shall sell the securities to himself." Brandeis was not necessarily concerned with the "too big to fail" doctrine, but instead believed that banks should have separate functions and broke down these functions into four parts: commercial banking, trust and insurance, corporate underwriting, and brokering (Kregel, 2010).

The second key point of the Glass-Steagall Act incorporated the separation of commercial banks and investment banks. In 1922, sixty-two banks offered clients securities services within the actual bank (Neal & White, 2012). Even greater was the number of banks with separate security affiliates, which rose from only 10 in 1922 to 114 in 1931. Bond originations from commercial banks rose by over twenty percent in the same time period. Large corporations were accustomed to dealing with investment banks and were not the source of the tremendous growth in security transactions for commercial banks. Instead, this growth came from small and middle-sized companies that were beginning to deal in the booming security markets (Neal & White, 2012). Senator Carter Glass convinced other congressmen that commercial banks would indeed have a conflict of interest if they were able to both accept deposits and deal in securities transactions. Therefore, this separation barrier restricted commercial banks from underwriting and selling securities while simultaneously preventing investment banks from taking deposits. Commercial banks (as long as a member of the Federal Reserve System) could no longer have

securities affiliates. Essentially, it guaranteed that the safety of the FDIC would not be compromised to fund the high risk, speculative investments that Wall Street investment banks were accustomed to, nor would it have the ability to rescue them if their investments turned south (Mitchell, 2010). Partly due to this barrier, the country experienced vigorous growth backed by strong stability of the financial market for the next fifty years. Commercial banking experienced stability from such regulation and strong barriers to entry, investment banks were lucrative in government securities and international markets, and the stock markets steadily gave investors dividends and capital gains under the newly created SEC's regulation (Neal & White, 2012). All three branches of the financial system appeared to intertwine to the benefit of the economy as a whole.

However, it must be noted that the Glass-Steagall Act was only partly responsible for the years of economic growth following the Great Depression. For example, World War II crippled every country in Europe, while it strengthened the economy of the United States. Regardless of this fact, it is clear that the Glass-Steagall Act played a part in banks' prolonged success.

III. Emergence of Shadow Banking

Shift from Commercial Banking

After decades of a healthy economy that saw very few large banks fail, a change started to appear in the financial industry. The intended effect of the Banking Act of 1933 and specifically the Glass-Steagall Act, was to ease public concern over bank runs and solvency issues. In a general sense, the bill accomplished its goal, but not without creating unintended consequences. The commercial banking industry was slowly trying to shave back the shell cast over it by the Glass-Steagall restrictions, but tried to do so in a way that kept the governmental guarantees in place (Acharya, Cooly, Richardson, & Walter, 2011, p. 2). The reason behind commercial banks' constant plea for deregulation of Glass-Steagall was that they were losing customers to competition due to innovation of new financial products. However, the competition was not from other commercial banks, but from a different sector of banking.

This other banking sector started emerging as a result of light regulation in the 1970s. Coined "shadow banking" in 2007 by former Pimco manager and economist Paul McCulley, these financial intermediaries evolved as spin-offs that operated in the "shadows" of commercial banks, or off the balance sheets of regulated commercial banks (Noeth & Sengupta, 2011). There were several factors that contributed to the financial innovation era, but, just as the market crash in 1929 might have kick started the Great Depression, if a breaking point had to be assigned

as the trigger for this growth in financial innovation, one would look to the collapse of the Bretton Woods system. In short, the Bretton Woods system sought to maintain an international financial system with the allies of WWII, and its collapse in 1973 exposed weakness in the US financial system. Financial innovations developed at this time in response to the challenges and competition that followed the liberation of international capital markets (Neal & White, 2012). It is important to note that while the term “shadow banking” might sound prejudicial in its description, it is in fact a crucial part of the financial system. Shadow banking grew tremendously, evidenced from the fact that traditional banks’ share of U.S. financial assets had declined by more than fifty percent (Date & Konczal). Figure 1 below shows the growth of shadow bank liabilities compared to that of traditional bank liabilities. As previously stated, the growth in shadow banking began in the mid-1970s, but it didn’t really take off until the late 1980’s as financial markets for instruments such as derivatives expanded its customer base.

Shadow Bank vs. Traditional Bank Liabilities

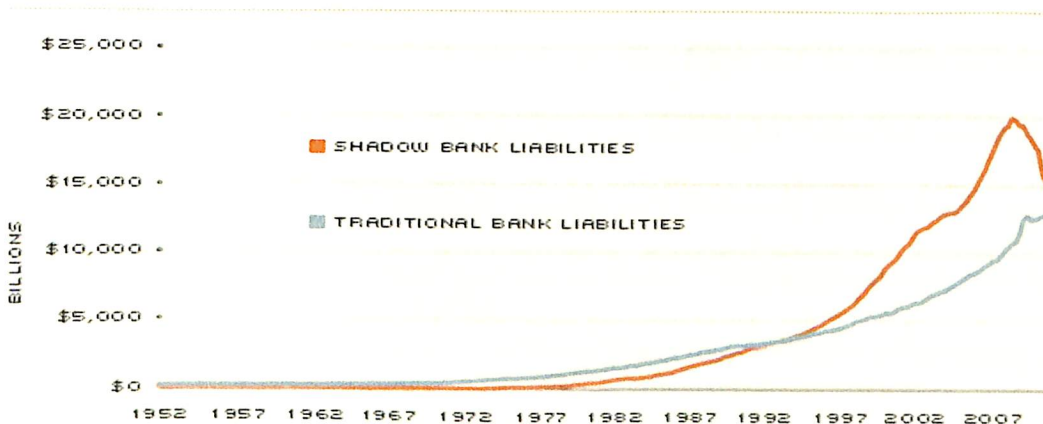


Figure 1 (Noeth & Sengupta, 2011)

Members of commercial banks believed that in order for commercial banking to remain competitive in the market, it needed to free itself from the shackles of the government regulation.

Commercial banks, funded by demand deposits, were starting to be replaced by the capital market-funded shadow banks (Neal & White, 2012). Why were commercial banks losing customers to new shadow banks? What separates shadow banking from traditional banking is the method in which the bank operates; shadow banks look like a bank and operate similar to a bank, but are able to operate free from regulation. In order to receive the freedom of light regulation, shadow banks had to use other financial instruments for funding instead of deposits like those used by commercial banks, meaning they were “without access to central bank liquidity or public sector credit guarantees” (Noeth & Sengupta, 2011). In fact, former Federal Reserve chairman Paul Volcker argued that with the help of recent financial innovation, these shadow banks were created *specifically* to dodge regulations that held back commercial banks (Acharya, Cooly, Richardson, & Walter, 2011, p. 3).

One of the several components of a shadow bank was the ability to provide maturity transformation similar to commercial banking by collecting funding through short-term deposit-like instruments such as money market funds, and using them to provide long term credit to financial firms. Thus, shadow banks would then be able to go through the process of offering direct loans. Figure 2 illustrates the relationship between shadow banking and traditional banking.

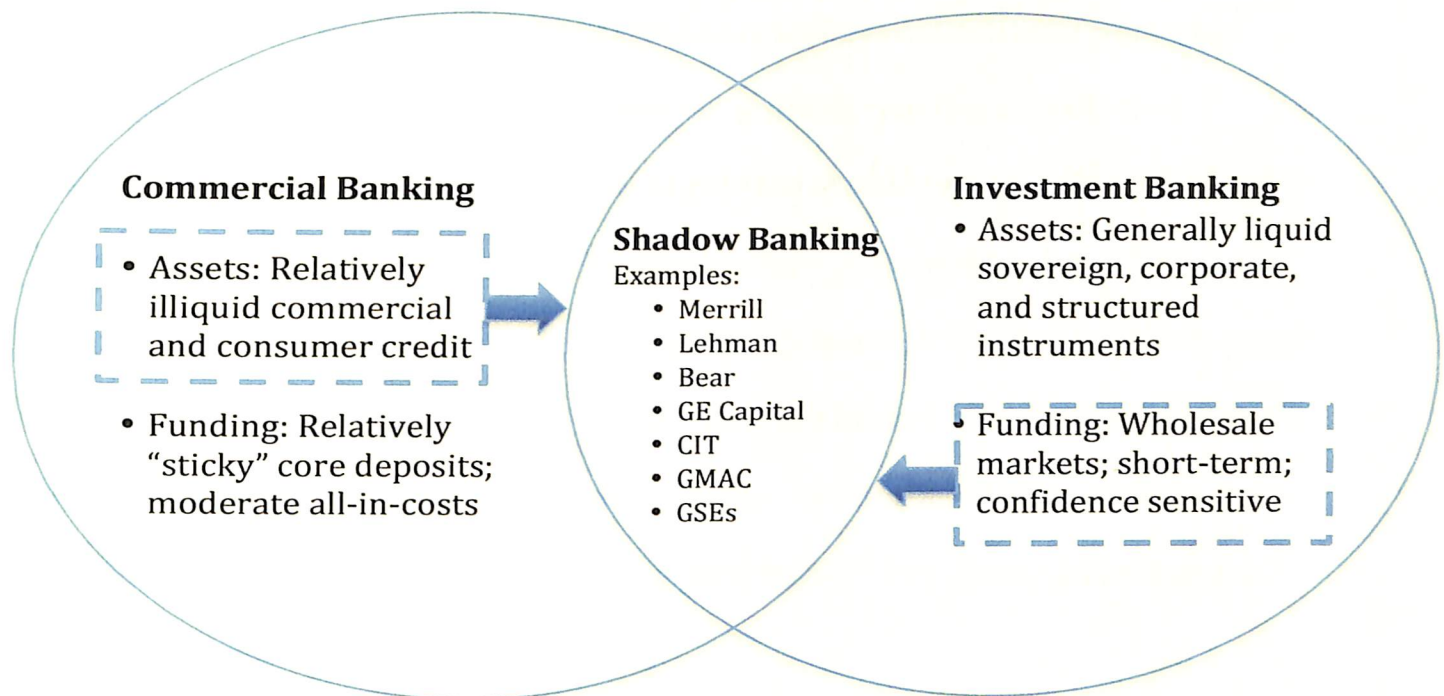


Figure 2 from (Date and Konczal)

As Acharya, Cooly and Richardson (2011, p. 2) point out, there was extreme liquidity for these illiquid loans by way of the derivatives and securitization markets, all which operated relatively free of regulation.

Commercial banking was not as profitable after regulation due to the increased cost of funding, as the banks had to pay insurance premiums among other costs for receiving deposits. A shadow bank's funding, on the other hand, was not insured and was initially viewed by the government to be less susceptible to systemic risk. This gave shadow banks the advantage of securing funding at lower costs (Date & Konczal). On top of this funding advantage, rating agencies, which acted as a cheaper form of regulators, did not require as much capital support as governmental bank regulators, giving shadow banks a leverage advantage. Because of these advantages, shadow banks were able to attract clients to its lower-cost

capital market. For example, corporate clients preferred short-term financing through commercial paper markets, and the growing consumer credit card businesses moved to specialty finance companies that were mostly funded by off-balance sheet securities. Many of the clients who remained with deposit-based commercial banks were asset classes not well represented in capital markets. Small to middle-market businesses with higher risk were unable to make the shift, which was not necessarily beneficial to commercial banks. Essentially, banks were losing profits and taking on more risk by losing their high-quality clients while keeping many high-risk clients (Date & Konczal).

The Banking Act of 1933 started to become irrelevant as financing shifted from commercial banks to non-bank institutions. Deposit insurance, a strict and explicit method of risk control, was replaced with uninsured money market funds that were perceived to be risk-free. In other words, most of the financing through financial intermediaries effectively stayed the same while still circumventing tight regulation. As seen in 2007-2008, these shadow banks would become susceptible to bank runs similar to commercial banks prior to the Glass-Steagall Act.

IV. How Shadow Banks Operate

The origin of the term “shadow banking” stems from two sources—it reflects both the ambiguity surrounding the system and the fact that these non-bank institutions operate in the “shadow” of heavy banking regulation. The Financial Stability Board, an international committee designed to advance the nature of financial regulation, claims that there is no specific definition of the shadow banking system due to its constant fluidity and innovation, but broadly describes it as “credit intermediation involving entities and activities outside the regular banking system” (Financial Stability Board, 2011). In order to grasp the banking panic of 2007-2008, one must understand how shadow banks function. This section will explain in further detail three crucial elements that most shadow banks rely on for operation, namely money market mutual funds (MMMFs), securitization, and repurchase agreements. Chapter 5 will clarify how these three financial instruments all contributed to the system risk and illiquidity of many financial institutions in 2008.

Money Market Mutual Funds

The main distinction between non-bank intermediaries and commercial bank intermediaries is the composition of the liability side of the balance sheet. The shift in intermediation from commercial banking to other institutions is not a result of the deposit system failing. For most investors, the deposit system is a safe system for storing their savings. However, deposit insurance is not ideal for rich

corporations, hedge funds, pension funds, and other institutions that need access to safe, short-term investments with the ability to withdraw upon demand (Gorton & Metrick, 2010). The FDIC insurance level of \$250,000 clearly would not provide much comfort for institutions depositing several millions of dollars.

One of the financial innovations in the 1970's that transformed the banking system was the creation of one of the most popular forms of short-term investments—money market mutual funds (MMMFs). The SEC provides a thorough explanation of the defining characteristics of MMMFs:

Money market funds typically invest in government securities, certificates of deposit, commercial paper of companies, or other highly liquid and low-risk securities. These funds have relatively low risks compared to other mutual funds and pay dividends that generally reflect short-term interest rates. They attempt to keep their net asset value (NAV) at a constant \$1.00 per share – only the yield goes up and down. But a money market's per share NAV may fall below \$1.00 if the investments perform poorly. While investor losses in money markets have been rare, they are possible. (U.S. Securities and Exchange Commission, 2013).

MMMFs are able to offer higher returns than their deposit-based counterparts for two reasons. For one, the assets that MMMFs invest in have a potential for a higher return. The other reason is that MMMFs are less regulated, while the Federal Reserve's Regulation Q capped deposit interest rates. Gorton and Metrick believe that MMMFs are one of the most significant innovations in the financial market over

the past fifty years, evidenced by the rapid growth since inception. In 1980, MMMFs' assets under management totaled roughly \$76 billion. Twenty years later in 2000, the assets under management totaled \$1.8 trillion. At the height of the financial crisis in 2008, assets under management for MMMFs totaled \$3.8 trillion in the United States alone (Gorton & Metrick, 2010).

Money market mutual funds have been able to be successful due to the belief that they are just as reliable as demand deposits at commercial banks, yet offered a higher return. In the history of these funds, only two MMMFs have "broken the buck," or dipped below the \$1 per share net asset value (NAV). One reason for this low failure rate of money market funds is due to fund sponsors stepping in and contributing to the fund to maintain the NAV. The SEC reported in December 2012 that almost 160 MMMFs have requested SEC approval to use cash from a parent company to support the value of its fund. The SEC acknowledges that the existence of these requests for permission does not necessarily mean that support is needed. In some cases, funds may desire to purchase certain securities that have increased risk to investors in order to maintain the fund's reputation (ElBoghdady, 2012). Brady, Anadu and Cooper conducted a study on the frequency and size of sponsor support on 341 MMMFs from 2007-2011. The data led to the conclusion that at least seventy-eight of the funds were provided support totaling \$4.4 billion, with some funds receiving support more than once (Brady, Anadu, & Cooper). In many of these funds, the support was not only just a means of maintaining the credit rating or lowering risk exposure, but it was a true means of resuscitation. Further, in 21 of the funds, support of over 0.5% of assets under

management (AUM) was implemented, which could be a signal that the NAV of the fund would have dipped below \$1 per share had it not been for the support. An assumption could be made that several of the MMMFs in 2007-2008 would have broken the buck had it not been for sponsor support.

Another contributor to the low failure rate of MMMFs is regulation from the government. The Investment Company Act of 1940 places restrictions on which securities MMMFs are permitted to invest in. For example, commercial paper is an instrument that MMMFs invest heavily in, but they are allowed to invest only in those with the highest or second-highest rating from two rating agencies. A fund may not hold more than five percent of the fund's assets in securities with the second-highest rating. Also, a fund may not hold more than one percent of any individual issuer (Acharya, Cooly, Richardson, & Walter, 2011, p. 307).

Securitization

Arguably the most important innovation to the development of the shadow banking system was the introduction of securitization. Joseph Shenker and Anthony Colletta defines securitization as follows:

The sale of equity or debt instruments, representing ownership interests in, or secured by, a segregated, income-producing asset or pool of assets, in a transaction structured to reduce or reallocate certain risks inherent in owning or lending against underlying assets and to ensure that such interests are more readily marketable and, thus, more liquid than

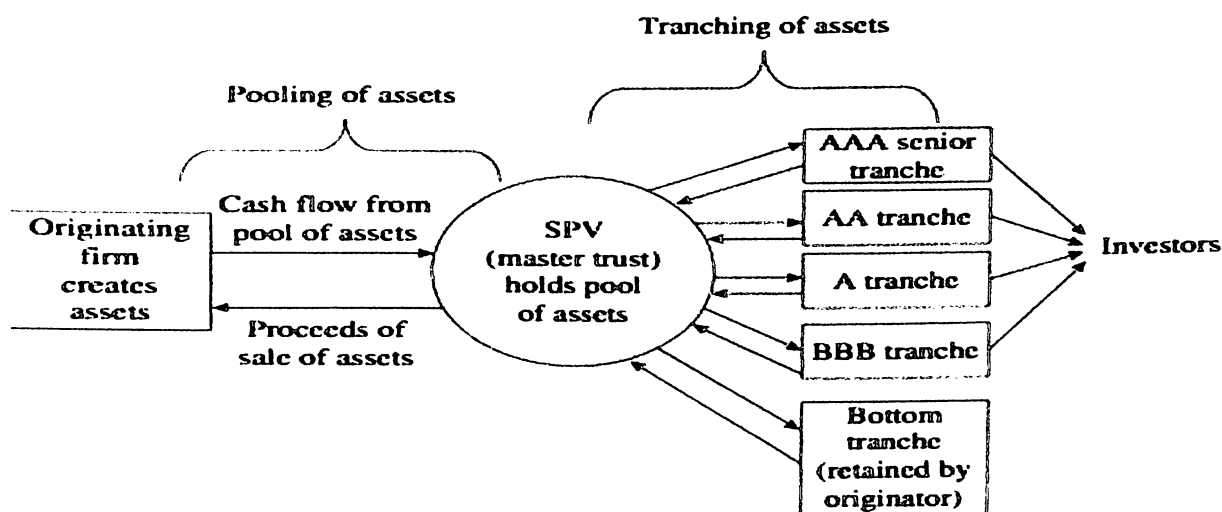
ownership interests in and loans against the underlying assets. (Klee & Butler, 2002)

It can more broadly be described as simply the pooling together of claims on financial assets and packaging them into an instrument that can be sold in capital markets. The first step in the securitization procedure requires isolating the specified cash flow generating assets that will actually be involved in the security. Typically, these include assets such as mortgages, commercial paper, credit card receivables, auto loans, etc. The characteristic that is consistent with almost all assets used in securitization is that of a predictable income in order to make the principal and interest payments. These assets are then bundled into a portfolio, which is sold to a special purpose vehicle (SPV), which is a subsidiary of the originating firm (sponsor) created solely for the purpose of servicing the security payments, similar to the fiduciary responsibility of a trust. An SPV acts as a separate institution in a legal sense, and it does not have employees or an office location. It is merely a name with a set of rules that outline what is to be done with the asset portfolio. The SPV finances the purchase of the portfolio by issuing debt instruments to investors. Usually the portfolio is divided into seniority levels called tranches that offer different interest rates for each tranche. The most senior level of the security receives the lowest interest rate corresponding with the highest credit rating. If the underlying assets default, or fail to produce the necessary cash flows, then the junior tranches with the lowest credit ratings will suffer losses first. It is also important to note that the cash flows generated from the collateral assets are responsible for covering both the interest payments and the principal repayment of

the bond. The capital raised from the securitization can then be utilized for other investment opportunities (Dictionary of Economics). The popularity of securitization stems from its effectiveness in transforming many illiquid assets with long maturities that are unattractive to most investors into a debt instrument that can be traded in highly liquid markets. Securitization enables small investors to invest in a large asset pool. Figure 3 shows the cash flows moving between the parties involved in the securitization process.

Securitization is one of the methods by which firms are able to finance themselves “off of the balance sheet” by transferring assets to the SPV, meaning that once the sale of assets to the SPV is completed, the assets and liabilities can be removed from the originator’s balance sheet. This type of financing provides several benefits for both creditors and the originator, most significantly that of a bankruptcy cost benefit. SPVs are structured specifically to avoid bankruptcy.

Figure 3 - (Gorton & Metrick, 2010)



Without delving into the legal details of this structuring, should the portfolio of assets fail to generate the cash flows needed, an early amortization process will begin in which the principal is paid off instead of the coupon payments (Gorton & Metrick, 2010). Securitization provides an allocation of risk that protects the creditors of the SPV because they are able to remove themselves from the total financial risk of the originating firm, even in the event of bankruptcy. Ultimately, this allows the creditors to lend at an interest rate that reflects only the risk of the SPV (Klee & Butler, 2002). In other words, the debt created from the securitization would not include a bankruptcy premium, because there is essentially no risk of default. There are also costs involved in securitization—for example, the costs of setting up the SPV, losing the tax shield benefit of keeping debt on the balance sheet, regulatory costs, and moral hazard—but for the purpose of this thesis will not be discussed.

As stated earlier, there are several different asset classes that can be utilized in securitization. One that dominates a large share of securitizations is that of asset-backed commercial paper (ABCP). An ABCP is a securitization program that creates an SPV to issue commercial paper and then uses the loans to finance the purchase of a portfolio of assets. The receivables from the asset portfolio are responsible for the repayment of the commercial paper by the SPV. As securitization of assets became more popular, it was easier for SPVs to secure their commercial paper issued to investors. Adding to its practicality, firms prefer issuing ABCP because it is usually not required to be registered due to its short-term maturity, which greatly lowers the cost of issuing. Also, the SPVs of ABCP programs are able to purchase different

asset types, allowing for a diversified portfolio. Due to its extremely short maturity, liquid markets, and diversified portfolios of highly rated assets, ABCP was another form of deposit like debt.

Subprime mortgages, which allowed individuals with poor credit and low income to mortgage finance their home, became infamous in the wake of the 2008 financial crisis. Securitization facilitated the growth in subprime mortgages by supplying the demand for investing in this particular asset class. Subprime mortgages grew to roughly \$1.2 trillion in 2006, of which 80% was securitized (Gorton G. B., p. 63). In the case of subprime mortgages, securitization created an interlinking chain between financial institutions that resulted in a convolution of information. The role of securitization of subprime mortgages in the 2008 crisis will be expanded upon in the next chapter.

Repurchase Agreements

Another form of credit intermediation in the shadow banking system is the market for repurchase agreements, or repos. According to (Brickler, Copeland, & Martin, 2011), a repo transaction is a “financial transaction in which one party sells an asset to another party with a promise to repurchase the asset at a pre-specified later date”. It is similar to a basic loan secured by collateral, except that in a repo transaction, repo investors are able to sell the collateral in the event of bankruptcy.

In *Slapped by the Invisible Hand*, Gary Gorton explains that the repo market is built around information-insensitive debt, which is debt that is “immune to adverse

selection of privately informed traders” (p. 15). In other words, there is little risk of being taken advantage of a debt instrument’s value by someone more informed, as opposed to equity, which is extremely sensitive to information. Demand deposits were the original form of information-insensitive debt, but instruments such as money market mutual funds and repo markets have stepped in as an alternative. Repo is similar to deposits except that instead of individuals serving the role of the lender, other firms and institutions (e.g., pensions funds and hedge funds) are “depositing” their money short-term and receiving a bond as collateral. Gorton explains that the collateral is supposed to be information-insensitive, making the repo market a safe place to store cash. Similar to money market mutual funds, repo markets replaced commercial bank deposits by insuring large amounts of cash with collateral while also receiving a higher interest rate.

The following paragraphs provide an example of a repo transaction. A dealer in need of financing “repos” an asset-backed security with a value of \$100 to another firm. The lending firm pays \$100 for the ABS. At some point in the future, and in most cases the next day, the dealer will buy the ABS back for a repurchase price that is equal to the principal of \$100 plus interest. The rate of return, called the repo rate, a lender receives in a repo deal is equal to the repurchase price minus the selling price, divided by the selling price. The repo rate is parallel to the interest rate of demand deposits. If the dealer is unable to buy back the ABS, the lending firm takes over property of the security.

The counterparty risk is on the loan is usually minimal because it is secured and the interest is normally small. However, there is exposure to the risk of a

deviation of the value of the collateral. Depending on the risk of the collateral, lenders can require an overcollateralization, called a haircut. A 10% haircut would reflect an ABS worth \$100 that a lender will buy for \$90. If the dealer fails to repurchase the asset and the asset declines in value, the haircut offers protection for when the lender must sell the ABS and recover the loss. The haircut can be also be charged to the lender to protect against appreciation of the ABS in case the lender does not sell the ABS back, but this is usually not the case (Acharya, Cooly, Richardson, & Walter, 2011, p. 322). In terms of traditional deposit based banking, a repo haircut is effectively the same as reserve requirements for traditional banks. To increase bank solvency, a certain amount is required to keep in reserves for FDIC member banks. A haircut works in the same manner by demanding that shadow banks keep a certain amount of money in reserves for when borrowing in the repo market. The haircut can also be viewed alternatively as the equity portion of the loan. A 10% haircut would indicate a 90% loan to value ratio, requiring the bank to find the 10% from elsewhere. As will be discussed later, by the crisis in 2008, haircuts were as much as 45% of the repo asset value.

A valuable aspect of a repo transaction is rehypothecation, which allows the lender receiving collateral in a repo deal to freely use the collateral in another separate transaction. The collateral initially received can be used as collateral in another transaction. Then that party can turn it over again to another party. The idea of rehypothecation shows the extent of interlinking between banks and also for the demand of collateral in daily operations. The repo market is built on the collateralized loans, meaning that when a shortage of “information-insensitive”

collateral occurs, it will create a strain on the entire repo market. As we will see, rehypothecation can contribute to systemic risk by extending the already extensive and complex link between financial firms.

V. Banking Panic of 2008

There are many contributing factors to what happened to the global financial system in 2008, though the most talked about factors are the deterioration of housing prices, the subprime mortgage bubble, alleged predatory lending, etc. It is similar to the credit fueled growth prior the Great Depression. As previously explained, what ultimately sent the economy into a downward spiral during the Great Depression were bank runs that deprived banks of funding to issue loans. With a shortage of debt, consumers and corporations could not generate the funding to buy personal items like a house and corporations were unable to invest in equipment or materials. Due to the implementation of deposit insurance, bank runs were thought to be a thing of the past. However, what occurred in 2007 and 2008 was also a bank run, only it was outside of the commercial banking deposit system. There was a run on the shadow banking system comprised of repo markets, money market mutual funds, asset-backed commercial paper, and other forms of short-term debt.

The common theme with the various discussions throughout this thesis is the necessity of collateral to the shadow banking system. In Chapter III, it was explained that shadow banks do not have central bank liquidity or guarantees on its liabilities because it is financing off of the balance sheet. Therefore, in order to offer a substitute to the demand deposit system, shadow banks must put up collateral to insure default risk in a similar fashion to deposit insurance. The amount of collateral required depends on a number of factors, but it must be noted that there

is a relationship between collateral and credit rating; a downgrade in an institution's credit rating will likely trigger collateral posting and termination payments in the same manner as an increase of the cost of debt for downgraded corporate debt (Gorton G. B., 2010, p. 25)

A large portion of the asset classes used as collateral in the shadow banking system are subprime mortgage backed securities. Most subprime mortgages have adjustable rates, which were structured in a way that essentially required refinancing and the appreciation of housing prices. The subprime mortgages could be sold into a particular asset-backed security called a collateralized debt obligation, which in turn were sold to structured investment vehicles, and so on, creating a long chain interlinking financial institutions. There was a lack of transparency with the interlinking and the final resting points of the securities were not always known, if at all.

Coupled with this lack of transparency, the introduction of the ABX (Asset backed securities index) also should be credited to the banking run in 2007. Created in January 2006, these indices are responsible for providing information on the health of subprime mortgage values. The main point of the index is that it allowed for the trading of subprime risk via credit derivatives. As (Gorton G. B., 2010) describes it, "participants were finally able to express views about the value of subprime bonds by buying or selling protection."

Even though it was virtually impossible to track the interlinking chain involving subprime mortgage securities, the idea behind the subprime mortgage securities is an attractive one, as long as housing prices continued to climb. From

2000 to 2006, a period of rapid growth in subprime mortgages, housing prices maintained a positive growth rate and refinancing was possible. Through the process of securitization, originating banks participated in the “originate to distribute” plan, a term describing the philosophy of creating as many mortgages as one can, and then selling them off of the balance sheet. Many believe that this plan led to an increase in predatory lending. For years it went unnoticed, however, and beginning in 2006, short-term interest rates rose, economic growth slowed down, and housing prices started to decline (Investment Company Institute, 2009). The subprime borrowers were unable to refinance, and the interest rate spike from their adjustable rate mortgages sent thousands of homes into foreclosure.

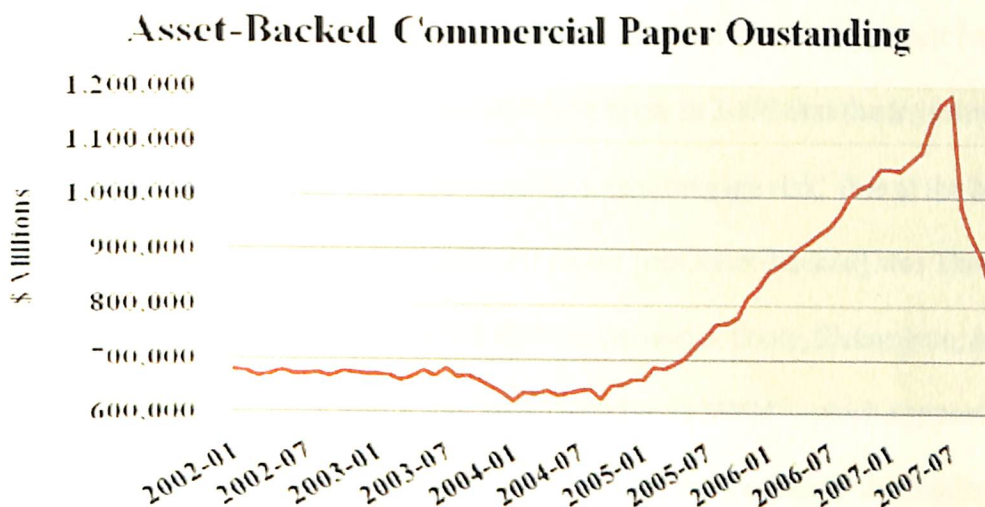
Run on Asset-Backed Commercial Paper

The idea of an interlinking between financial institutions tied together by securities has been touched upon briefly. Unfortunately, not many knew the extent of this chain until it was too late. Subprime mortgages became an increasing component of asset-backed securities, and their problems began to infect the credit markets. Asset-backed commercial paper had a dominant share of the credit market, representing approximately \$1.4 trillion in assets just before the crisis (Carey, Correa, & Kotter, 2009). In the summer of 2007, credit rating agencies started to realize the problem and reacted by downgrading securities that were backed by subprime mortgages. Several financial institutions like hedge funds and cash-like pools were unable to sell mortgage-related assets and suffered huge losses

from subprime mortgage trades. ABCP was not as safe as investors originally thought; it was not the alternative “information insensitive” deposit-like debt instrument that it tried to mimic. In 2007, the ABX index plummeted, indicating a drop in value of subprime mortgages. The result was a run on ABCP because investors knew very little about the exact exposure levels to subprime mortgages. It should be noted that the problem was not the size of the subprime mortgage market in itself. The problem was that it leaked into all facets of the banking system. Commercial banks and shadow banks, internationally or domestically, were affected. No one knew which firms were exposed to risk and which firms were protected. Subprime mortgages had been incorporated into securities, which in turn were combined with other securities, which created a fear that all firms had the possibility of exposure to subprime risk.

(Covitz, Liang, & Suarez, 2009) conducted an empirical study on the ABCP run in 2007 and reached three conclusions. First, at the end of 2007, more than 120 ABCP programs, or roughly 40% of the entire ABCP market, were experiencing a run that had a low probability of recovery. A program was considered to be in a run if its outstanding paper was maturing but the program was unable to issue more. The second conclusion reached was that the run did not occur within all programs, but mostly weaker ones that had a lower credit rating. Finally, programs that were still able to issue CP had explainable variations with their yield spreads and maturity dates. Figure 4 on the following page shows the rise and fall of ABCP from 2002 to 2007. As seen in the figure, the massive run on ABCP decreased its total assets by roughly 34%.

Figure 4 - (Gorton G. B., 2010)



Run on Money Market Funds

Chapter 4 discussed the importance of money market mutual funds for investors looking to store large amounts of cash for a short time period. MMMFs are one of the largest suppliers of funding to the shadow banking system, and their failure would have devastating consequences. The run on ABCP exhibited a “flight to quality” in which investors substituted MMMFs for ABCPs. Indeed, one year from the start of the run on ABCP saw money market funds grow by more than \$800 billion, which is an increase of over 33%. Money market funds were safer due to a number of factors: low leverage, liquidity, transparency, and MMMFs had been divesting themselves of subprime mortgages (Investment Company Institute, 2009).

However, by September 2008, even MMMFs began experiencing stress. Only one MMMF had broken the buck prior to late 2008, so investors were not accustomed to potential losses in these funds. The stress was not a consequence of

investing in ABCP, because most funds did not realize losses from ABCP. The trigger that began the run on MMMFs started with the failure of one of the largest funds called The Reserve Primary Fund. Speculation grew in 2008 that the investment bank Lehman Brothers was exposed to subprime mortgage risk. One of the largest investors of Lehman Brothers commercial paper (not asset-backed) was The Reserve Primary Fund, investing \$785 million (Acharya, Cooly, Richardson, & Walter, 2011, p. 309). This was especially risky for an MMMF, which supposedly had the same risk level as demand deposits. In fact, the founder of the fund stated that MMMFs should never invest in commercial paper because it was an asset that carried too much risk. It appeared that the fund followed the founder's advice, because the Primary Fund's holdings report did not contain any commercial paper until 2006. From 2006 until its ultimate failure, the fund began investing in large amounts of commercial paper to try and increase its performance (Stecklow & Gullapalli, 2008).

Once news broke of Reserve Fund's holdings of significant amounts of Lehman debt, massive movement occurred to withdraw from not only the Reserve Fund, but also other MMMFs that held commercial paper. Investors feared that Lehman Brothers was not the only financial institution that had considerable financial risk, and that fear translated into an aversion towards commercial paper. The Reserve Fund ultimately broke the buck and folded, meaning investors were unable to withdraw at the fixed price of \$1 per share, while other MMMFs saw \$172 billion withdrawn within the week. Commercial paper in MMMFs fell from 24% of total assets to 17%, while government debt increased from 37% to 45% (Acharya,

Cooly, Richardson, & Walter, 2011, p. 309). Not until the U.S. Treasury Department guaranteed temporary insurance on MMMFs did the run stop.

Run on the Repo Market

Confidence is the most important aspect of the shadow banking system, and a lack of confidence can lead to a panic such as the banking panic in 2008 that the economy is still struggling to recover from. In the repo market, the confidence in the value of collateral determines the ability for firms to receive funding through repos. Obviously, lenders would not accept the risk of securing a loan by taking subprime mortgage backed securities as collateral, especially once default rates started to climb on these mortgages. There were plenty of other asset-backed securities completely unrelated to subprime mortgages that could have been used for collateral. So why was there a shortage of collateral that created a run on the repo market? As (Gorton G. B., 2010, p. 134) explains, the problem was the financial risk and exposure to subprime mortgage risk of banks that were posting the collateral. If these banks began to fail, repo investors would be holding assets that depreciated in value, not to mention the fact that the collateral might not be priced right to begin with. As concern over counterparty solvency grew, apprehension also began to grow over the liquidity of the collateral bonds. The influence of subprime mortgages pulled down the value of other asset-backed securities because firms wanted to hold more cash, causing the market for ABS to shrink, which forced a decline in value of ABS.

In order to compensate for the lack of confidence in collateral, lenders increased system-wide haircuts on the repo agreements, which had a devastating effect. As haircuts increased, firms that borrowed must find other ways to raise money to achieve the 100% of the value needed. For instance, if a firm needs \$100 and the haircut on a repo agreement is 20%, then the firm must find \$20 from another source. The other source had to come from the sale of assets, driving down the price even further on ABS. As a result, they were less useful as collateral, which in turn forced more sales (Gorton G. B., 2010). This circle of transactions was unsustainable and ultimately led to insolvency in the banking system. Figure 5 displays the near vertical rise in the weighted average size of repo haircuts in 2007. At the height of the crisis in September 2008, average repo haircuts went from 25% to over 40% within one month.

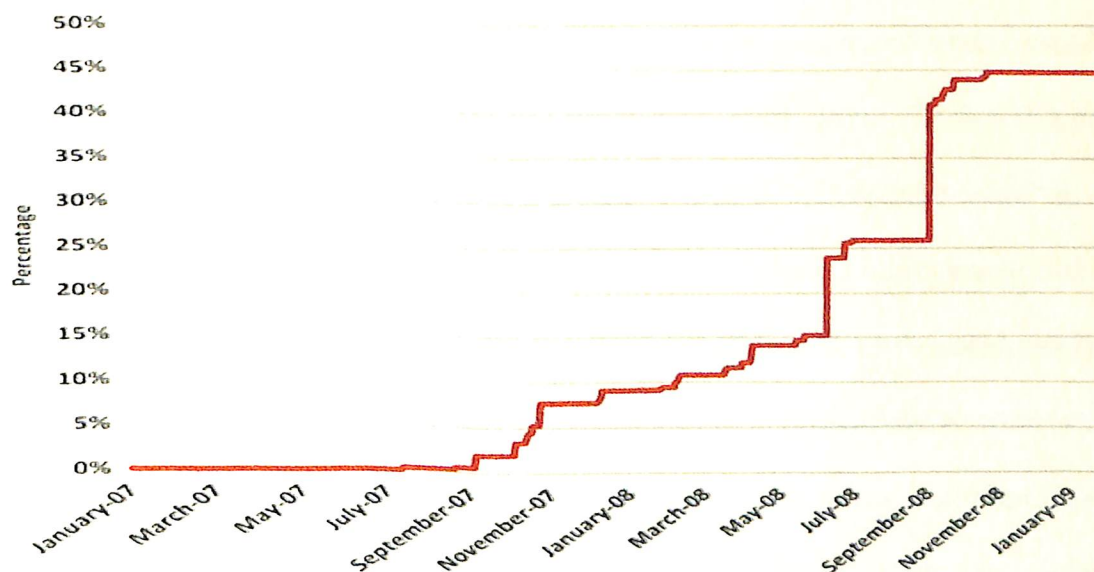


Figure 5 - (Gorton & Metrick, 2012)

Comparison to the Great Depression

Just as the series of bank runs in 1933 led to systemic risk for banks, the runs on various financial instruments in 2007 and 2008 led to global systemic risk. A situation occurred in the shadow banking system in which there was a deep, convoluted chain that tied financial institutions together through securities and other instruments. The difference between the Great Depression and the crisis in 2008 was that the runs were not carried out by individual investors from Main Street. Instead, it was financial institutions like hedge funds, money market funds, mutual funds, investment banks, and pensions funds that were racing to withdraw funds from their short-term, deposit-like debt instruments.

Also, the stopping point of risk exposure was unknown to most of these institutions due to the complexity of the transactions and the ability to keep a transaction going. For example, Firm A suffers from solvency problems and the possibility of bankruptcy is real. Hedge Fund B is overexposed with asset-backed securities from Firm A as collateral in the repo market. Firm C holds the asset-backed collateral from Firm A because Hedge Fund B "rehypothecated" it. Money Market Fund D is exposed to Firm C's risk because it holds a large amount of its commercial paper and therefore reduces its overall holdings in commercial paper. Firm D now is experiencing liquidity crisis because a significant amount of its funding came from rolling over commercial paper with money market funds.

As the previous paragraph shows, the interlinking of financial institutions created a major threat of systemic risk. It became an even larger problem in 2008

because large complex financial institutions (LCFIs), often identified as “too big too fail,” were exposed to excessive amounts of this systemic risk.

Both the Great Depression and the financial crisis in 2008 required government intervention to minimize the damage. Both instances resulted in significant financial legislation. In 1933, we saw the creation of the Banking Act of 1933 and Glass-Steagall Act, while in 2010, the Dodd–Frank Wall Street Reform and Consumer Protection Act was enacted. The effectiveness of Dodd-Frank has yet to be determined because the economy is still recovering from the current crisis. The next chapter will discuss reforms in certain areas of the shadow banking system.

VI. Attempt to Reform

There have been calls to reform the shadow banking system prior to the financial crisis in 2008, but there has yet to be significant reform. The Dodd-Frank Act passed in 2010 proposes regulation for traditional banking, however its impact on the shadow banking system has yet to be determined. Dodd-Frank's most notable regulatory constraint for shadow banks is the recognition and regulation of non-bank systematically important financial institutions (non-bank SIFIs). Under Section 113 of the act, if the Financial Stability Oversight Committee (FSOC) concludes that the financial risk of a non-bank financial institution could threaten the stability of the financial system, then the FSOC may subject that institution to enhanced supervision and regulation from the Federal Reserve Bank (Greene & Broomfield, 2013, p. 18). If designated a non-bank SIFI, that institution will undergo regulatory restrictions comparable to other banks. Also, it is important to note that the language of the Dodd-Frank Act relating to the process of designating and regulating the non-bank SIFIs is quite broad, granting the FSOC discretion over the final decision. The FSOC has not declared publicly any institutions as non-bank SIFIs, but plans to do so at some point in 2013 (Gibson, Dunn & Crutcher LLP, 2013).

Only time will show the effect of Section 113 on the shadow banking system. Regulation for traditional banking continues to strengthen, and therefore so does the growth of shadow banks as institutions seek to avoid regulation. New York Times Dealbook stated that many small, start-up companies are turning to hedge funds for financing after experiencing trouble receiving a commercial loan from

traditional banks (Gandel, 2011). Shadow banking is essentially a system that has the ability to provide funding for companies that otherwise cannot attain it. If more regulation was placed on shadow banks, some of these companies will have even more trouble financing operations. The effect of shadow bank regulation on shadow bank financing will be clear once the FSOC begins to designate the non-banks SIFIs.

VII. Conclusion

Although events such as the subprime mortgage crisis and the stock market crash undoubtedly contributed to the financial crisis in 2008, the panic from increased financial risk of the banking system was largely a result of a series of runs on funding markets such as asset-backed commercial paper, money market mutual funds, and repurchase agreements. In the latter half of the twentieth century, financial innovation and the desire to avoid more stringent banking regulation gave rise to the shadow banking system, a credit intermediation system that provides an alternate form of deposits and funding for investors and borrowers. Shadow banks had several different methods of credit intermediation, such as issuing securitized bonds or asset-backed commercial paper. Securitization fueled rapid growth in certain asset classes, particularly in subprime mortgages, which enabled subprime mortgages to infiltrate both traditional and shadow banking systems, creating systemic vulnerability to subprime risk. Ultimately, this led to a decline in the value of other assets used as collateral, leading investors to distance themselves from firms backing loans with said collateral. Similar to the aftermath of the Great Depression, these runs had a devastating effect on the current economy from which it is still struggling to recover.

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