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The Role of Money Market Mutual Funds in the Shadow Banking Sector Since the 2010 & 2014 SEC Reforms

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The Role of Money Market Mutual Funds in the Shadow Banking Sector Since the 2010 & 2014 SEC Reforms

Thesis Submitted to Levy Economics Institute of Bard College

by George Kiss

Annandale-on-Hudson, New York

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PLAGIARISM STATEMENT

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George Kiss

5/21/19

ABSTRACT

The analysis undertaken within this thesis questions the role of money market mutual funds (MMFs) in the shadow-banking sector since the 2010 and 2014 SEC reforms. In order to conduct such an analysis we provide a comprehensive history of the rise of these funds and how they contributed to the 2007-2009 Financial Crisis. A brief explanation of the 2010 and 2014 reforms is then given and we show that neither of these regulations have made these funds safer, but have increased the risk they pose to the overall financial system. We evaluate how the maturity distribution of securities held within MMF portfolios has been altered toward an emphasis on commercial paper. Further analysis is provided on how these funds have responded to the regulations in relation to their holdings of commercial paper. The percentage of commercial paper outstanding held in their portfolios, with fewer funds, is roughly equivalent to the amount held in 2008. Additionally, an alternative interpretation is given for the reaction of investors with the threat of a market downturn in relation to share redemptions. Finally, we provide an alternative policy proposal yielding a safer and more resilient MMF industry.

Keywords: Behavioral Theory; Financial Markets; Investor Psychology; Money Market Funds; Securities Law; U.S. Money Market Fund History

JEL Classifications: E44; E71; G23; G41; K22; N22

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INTRODUCTION

Money market mutual funds (herein referred to as “MMFs”) represent a minor portion of the shadow-banking sector, however, even with their relatively small size these institutions cannot be categorized as being inconsequential. Since their inception in 1974, with the Reserve Primary Fund (“RPF), MMFs have played a crucial role in the development of the modern financial system. The risks posed by MMFs were critical in the development of the Global Financial Crisis (“GFC”). Since the GFC, regulatory agencies have implemented numerous and widespread regulations throughout the financial sector including MMFs. The regulations are intended to provide stability within the financial system thereby enhancing as well as stabilizing economy activity.

Regulations, or reforms, were implemented upon MMFs in 2010 and, again, in 2014 with the twofold purpose of making the institutions safer and the investors more attentive to the risks entailed in such institutions. While the reforms of 2010 and 2014 should enhance the stability of these funds there were unintended consequences. Both sets of regulations were merely “smoke and mirrors” as they did not address the true risks within the MMF industry. This exposition intends to bring new light upon the MMF industry by posing the question: “What Role do MMFs Play in the Shadow Banking Sector Since the 2010 & 2014 Reforms?”

This paper will provide evidence that MMFs are a vital aspect of the shadow-banking sector. MMFs are able to play such a crucial role by purchasing the commercial paper as well as asset-backed commercial paper of financial firms. As will be shown, the 2010 reforms directly address the issue of MMFs’ purchase of commercial paper, however, no substantive change has been made as to the amount MMFs can hold within their portfolio. Before exploring the 2010 and 2014 reforms, Chapter 1 defines an MMF, provides the history of the MMF industry, and their portfolio composition with specific reference to the type and maturity of assets in which they invest. Chapter 2 will shed light on the role the MMF industry played in the most recent financial crisis. It will show how the Federal Reserve and the Treasury implemented programs in order to stop the run on MMFs and provides an exposition of the 2010 and 2014 reforms, which were enacted by the Securities and Exchange Commission (“SEC”) – the MMFs’ regulatory agency.

Chapter 3 will provide the theoretical framework, which will then be used in evaluating the risks MMFs still pose to the overall financial structure of the economy. It will provide a theory of diversification risk, maturity risk, and concentration risk applied to the composition of

MMF portfolios. It then examines how the financial composition of MMFs – specifically prime institutional and prime retail funds – changed after each set of reforms were enacted, with a focus on the holdings of commercial paper and funds liquidity levels. With respect to how investors may react to market difficulties, Keynes’s (1936) and Lavoie’s (2014) liquidity preference theory will be presented. Analysis of the 2014 reforms will be based on the behavioral economic theory proposed by Daniel Kahneman and Jason Bargh. Finally, the conclusion of Chapter 3 consists of a policy proposal to make the MMF industry less risky.

CHAPTER 1: EXPLANATION, BACKGROUND, ASSETS & EMERGENCE

A money market mutual fund (“MMF”) can be defined as a mutual fund that invests in a diverse selection of low-risk short-term assets. Investors receive a dividend which “reflects the level of short-term interest rates,”¹ earned by the fund’s assets. As will be explained below, initially most MMFs issued shares at a constant \$1.00 net asset value (“NAV”). Thus, if the NAV fell below \$0.995 there was a risk that the fund would not be able to redeem the shares outstanding at \$1.00. Because MMFs promised a stable par redemption they were considered to be as good as a bank deposit.

There are three varieties of MMFs’: prime funds (institutional & retail), government, and tax-exempt funds. Prime funds, which are the riskiest, invest in a diverse group of assets, such as Treasury bills, repurchase agreements, and commercial paper. Prime institutional funds target institutional investors, usually with a minimum investment of \$1 million, whereas prime retail funds offer a minimum investment within a range of “\$500 to \$5,000” (Macey 2011, 137). Retail funds also offer the convenience of allowing investors to write checks on their accounts. Government MMFs, on the other hand, are considered to be the safest because they are only allowed to invest a small portion of their portfolio in assets other than government securities. And, finally, tax-exempt funds are considered to be relatively safe due to their small size, in comparison to prime and government funds, and invest in municipal securities.

As Bernanke (2013), Cochran et al (2015), Kregel (2012), and Miller (n.d.) note MMFs sell (issue) shares to investors and in turn purchase assets of, supposedly, high liquidity of short duration. This process can be defined as credit intermediation, as Hanson, Scharfstein, and Sunderman (2014), Kacperczyk and Schnabl (2013), Miller (n.d.), McCabe (2010), RPWG

¹ (Hanson, H, S., Scharfstein, S, D., and A. Sunderman 2014, 3)

(2010),² Schapiro (2012), and Scharfstein (2012) note, an MMF obtains savings from individuals and invests these savings into higher yielding assets. Additionally, this process can also be considered liquidity transformation in which an MMF transforms illiquid assets into liquid assets through the sale of these assets (indirectly) to individuals in the form of MMF shares. On the other end of the spectrum, Kregel (2012) notes this process as creating fictitious liquidity, where the MMF must receive payments from the assets it holds in order to continuously pay interest on the shares it issues which are currently outstanding.

The assets held by MMFs are diverse and range from risk-free assets to assets carrying a high degree of risk. The safest asset an MMF can hold is a U.S. Treasury security which is considered a risk-free asset because the U.S. government has a low-risk of default (Wray, 2012). In addition, Stigum and Crescenzi (2007), Fisch (2015) and Macey (2011) state MMFs hold a plethora of assets including repurchase agreements, certificates of deposit, “checkable deposits and currency, credit market instruments, agency- and GSE-backed securities, municipal securities, corporate and foreign bonds,”³ commercial paper and asset-backed commercial paper.

A repurchase agreement represents “contracts involving the *simultaneous sale and future repurchase* of an asset, most often Treasury securities.”⁴ Certificates of deposits issued by commercial banks are “certificates which indicate that specified sum of money has been deposited in the issuing depository institutions [and] ... states the amount of the deposit, maturity date ... the interest rate, and the method by which the interest rate is calculated” (Stigum and Crescenzi 2007, 58). Finally, checkable deposits are deposits at depository institutions in which the fund can write a check and currency is simply cash held in the portfolio.

Credit market instruments refer to the short-term outstanding liabilities of financial as well as nonfinancial institutions. Agency- and GSE-backed securities, as defined by the Financial Industry Regulatory Authority (“FINRA”), are: “bonds issued or guaranteed by U.S. federal government agencies; and bond issued by government-sponsored enterprises (GSEs) – corporations created by Congress to foster a public purpose, such as affordable housing.”⁵ A municipal security “is a debt security issued by a state, municipality our country to finance its

² Report of the Money Market Working Group (2009)

³ (Stigum, M., and A. Crescenzi, 2007, 1103) Table 26.1.

⁴ (Stigum, M., and A. Crescenzi, 2007, 532)

⁵ <http://www.finra.org/investors/agency-securities>

capital expenditures...”⁶ Corporate and foreign bonds refer to the bonds issued by corporations, financial and nonfinancial institutions domestically and abroad.

Financial and nonfinancial institutions each issue commercial paper that serve the same purpose. As stated by Anderson and Gascon (2009) and Post (1980), financial and nonfinancial commercial paper represents an unsecured promissory note or more commonly, unsecured short-term debt, with the maturity date ranging from 60 to 270 days and is considered an alternative to traditional bank lending. Financial and nonfinancial commercial paper is issued by, for example, “industrial firms, public utilities, bank holding companies, and consumer finance corporations” (Anderson and Gascon 2009, 590). Since the issuance of commercial paper is considered an alternative to bank lending, the *raison d’être* for this type of paper is its use for the financing of working capital (Anderson & Gascon, 2009; Duygan-Bump et al, 2013; Kacperczyk and Schnabl, 2010).

Commercial paper is normally issued at a discount to its face value and upon maturity, the investor receives the face value including interest determined by the discount rate. It is held until maturity and usually rolled over by the issue of new paper to repay the maturing one – the risk to the issuer is therefore, the favor by the investor to accept new paper to redeem the initial issue (Anderson and Gascon, 2009; Kacperczyk and Schnabl, 2010). Asset-backed commercial paper (“ABCP”) differs substantially from traditional commercial paper in that the creation of ABCP is similar to securitization (Anderson and Gascon, 2009). In order for ABCP to be issued, an off-balance sheet entity is created, which “purchases pools of receivables from participating firms (or lends to these firms with their receivables as collateral),”⁷ and in turn issues commercial paper in order to purchase the assets – hence the term ABCP.

As already mentioned, an MMF issues shares – its liabilities – in order to purchase assets, such as the ones described above. The shares MMFs offer are considered to be redeemable securities by investors and upon redeemability, the investor has a claim on “the fund’s current net assets or cash equivalent,” which adds a layer of risk for the fund as well as the investor (Cochran, Freeman, and Mayer Clark 2015, 876). Moreover, the shares issued by MMFs must be redeemed by the fund itself, a secondary market does not exist for the trading of MMF shares (Miller, n.d.). The underlying risk associated with share redeemability is that it occurs on demand, thereby increasing the risk of a run on funds in times of market stress

⁶ <https://www.investopedia.com/terms/m/municipalbond.asp>

⁷ (Post 1992, 885)

(McCabe, 2010). In normal times this risk is commonly associated with a liquidity mismatch – the fund assets are illiquid and the shares guaranteed by the fund are perfectly liquid. In times of abnormal market conditions, MMFs will have to sell assets in order to meet redemptions, which will impact the short-term credit markets (Miller, n.d.). Additionally, if investors begin to redeem en masse during periods of market stress, an MMF may not be able to satisfy redemption requests due to the illiquid markets, and may not be able to honor the \$1.00 NAV guarantee (Fisch, 2015; Hanson, Scharfstein, and Sunderman 2014; Miller, n.d.; Scharfstein, 2012).

The existence of redemption risk raises the question of whether these funds are insured, privately or publicly, against the risk of an excess of redemption requests causing a markdown in the portfolio of assets below \$1.00 commonly known as “breaking the buck”. While MMFs do not have either private or public insurance most of them have a sponsor which is “a financial institution that is either a stand-alone asset manager or a financial conglomerate” responsible for managing the portfolio and determining the overall risk the fund is willing to take (Kacperczyk and Schnabl 2013, 1081). Although sponsors are under no obligation, from the SEC or any other regulatory body, to provide support to a fund in distress, they usually mitigate damaging effects of runs, alleviating the risk of a failure (Kacperczyk and Schnabl, 2013; Macey, 2011; McCabe, 2010; Moody’s Investors Services, 2010; Peirce and Greene, 2014). A sponsor can provide support to a fund in numerous ways such as: “the purchase of distressed assets from funds at par, execution of Letters of Credit ... capital support ... letters of indemnity or ... guarantees (Moody’s Investor Services 2010, 3). If a sponsor provides support to a fund experiencing difficulties, for example, meeting redemption requests due to portfolio deterioration, sponsors usually absorb losses investors otherwise would have to bear (Brady, Anadu, and Cooper 2012; McCabe, 2010).

Before we discuss the emergence of the MMF industry we must consider other risks MMFs can pose to the financial system as well as the risks imposed upon the MMF industry by the financial system. The risks MMFs encounter are portfolio risk, credit risk, interest rate risk, liquidity risk, and redemption risk (McCabe, 2010). If we take portfolio risk alone, it is apparent MMFs have been proven to chase yield, in which an MMF invests in riskier securities in order to offer higher returns and increase their assets through the issuance of new shares to investors (Hanson, Scharfstein, and Sunderman 2014; Kacperczyk and Schnabl, 2013; Scharfstein, 2012).

If an MMF chases yield in order to attract investors, this also increases the credit risks MMFs face.

Credit risk entails, for example, an issuer of commercial paper not being able to meet its past commitments or to rollover its outstanding paper, thereby reducing the MMFs' portfolio returns. Since MMFs own a substantial amount of liabilities in the form of commercial paper credit risk also imposes systemic risk on the system (Scharfstein, 2012). However, (Miller n.d., 13) argues that, as securities held in MMF portfolios are "issued by large and well-reputed economic organizations and are generally very liquid", MMFs do not face substantial credit risk nor do they face substantial interest rate risk. Nevertheless, it will be shown in Chapter 2, dealing with the financial crisis, this claim is far from reality.

The interest rate risk MMFs encounter within their portfolio is due to volatility in credit markets, which can transform into either credit or portfolio risk, and further destabilize the fund if the movements are substantial. MMFs are also faced with the risk of large redemptions during periods of instability – run risk. Funds that implement yield chasing strategies in order to increase their assets have proven to be the most susceptible to run risk in times of crisis (Hanson, Scharfstein, and Sunderman 2014; Scharfstein, 2012). Such redemptions can cause a fund to risk breaking the buck. Prior to the 2010 and 2014 SEC reforms, MMFs had no policy tools at their disposal to prevent such run risk. The massive exit of investors from an MMF can have devastating effects because the MMF will have to sell assets in order meet redemptions. However, once the most liquid assets are sold, there is little chance an MMF will be able to liquidate the remaining illiquid securities in its portfolio (Birdthistle, 2010). Finally, there might be destabilizing effects due to MMFs "allocating short-term funding to financial institutions", in the form of commercial paper, which is also the reason behind MMFs posing considerable systemic risk to the overall financial system (McCabe, Cipriani, Holscher, et al 2012, 1).

Considering the explanation of the basic features of the MMF industry, we can now begin to trace its rising importance since the creation of the first MMF, the Reserve Primary Fund ("RPF") in 1974. RPF was founded on the basic principle of investing in short-term government issued securities as well as securities issued by "the largest and safest corporate issuers" (Birdthistle 2010, 1164). The introduction of MMFs in the 1970s did not witness exponential growth because they were originally offered to institutional investors with a floating NAV instead of a constant one (Birdthistle, 2010; D' Arista, 1994). A floating NAV is drastically different from a constant NAV in that a floating NAV embodies risk of price

deviations within the underlying portfolio of securities held by the MMF. The value of the portfolio (the NAV) of an investment fund will fluctuate with the fluctuations in the value of the underlying securities comprising the portfolio. If there were no public market quotations for the underlying securities, the MMF would use fair-value accounting – essentially determining the value of the security in “good faith”, whatever that may mean (Birdthistle, 2010).

In regards to the market growth of MMFs, total assets increased from \$263 million to \$10.808 billion dollars between Quarter 1 of 1974 and Quarter 4 of 1978.⁸ This means an astonishing growth of 4,009.5% in four years. Additionally, the amount of commercial paper held by these funds increased from \$185 million to \$3.652 billion in the same period. Although this represented a decreasing share of commercial paper in total MMFs assets (from 70.34% to 33.78%), we must consider the portion of the outstanding market they held, which shows an increase in their portfolios from 0.33% to 3.49% during this time period.⁹

Even the rapid rate of growth between 1974 and 1978 was surpassed in the 1980s, as a result of MMFs petitioning the SEC in 1978 for valuation of their portfolios via amortized cost valuation to replace mark-to-market accounting. An SEC rule which allowed MMFs to switch from mark-to-market accounting to amortized cost valuation, solidified in Rule 2a-7 of the Investment Company Act in 1983, offered retail investors an attractive alternative to commercial paper and Treasury bonds which were only offered in denominations of \$100,000 (Birdthistle, 2010; Cochran, Freeman, and Mayer Clark 2015; Stigum and Crescenzi, 2007). Allowing an MMF to value the underlying securities in its portfolio with the use of amortized cost valuation, rather than mark-to-market accounting, resulted in MMFs switching from a floating NAV to a constant NAV.

Rule 2a-7 constrained MMFs credit risk, interest rate risk, and liquidity risks, in exchange for offering securities with a constant NAV (McCabe, 2010). Amortized cost values securities at their purchase price and allows for upward or downward adjustments, due to “premiums or discounts during the life of the instrument,” which offset price fluctuations of the underlying securities (Cochran, Freeman, and Mayer Clark 2015, 879; Miller, n.d.).

The constant NAV instead of a floating NAV gave the perception that MMF shares offered “comparable” liquidity to a bank deposit with a higher return (Birdthistle, 2010; Cochran, Freeman, and Mayer Clark 2015). Therefore, the switch provided MMFs the rapid

⁸ Federal Reserve Flow of Funds Data, L.121

⁹ Based upon authors calculation.

growth they were able to achieve, despite the large increases in total assets throughout their introduction, due to the comparability of federally insured bank deposits (Birdthistle, 2010). The comparison of MMF shares being equivalent to a bank deposit is well documented in the literature, spanning from (Bernanke 2013, 79) where the former Federal Reserve Chairman states “investors who put their money into a money market fund expect that they can take their money out at any time, dollar for dollar,” with similar comments found in (Cochran, Freeman, and Mayer Clark 2015; Macey, 2011; Moody’s Investors Services, 2010).

From Quarter 4 of 1978 to Quarter 1 of 1979, total assets grew from \$10.808 to \$18.020 billion dollars.¹⁰ This means that total assets nearly doubled in one single quarter – precisely by 67%. MMF purchase of commercial paper also witnessed miraculous growth during this time period as it grew from Quarter 4 of 1978 until Quarter 1 of 1979 from \$3.652 billion to \$7.012 billion – a percentage increase of 92%.¹¹ The share of commercial paper within their portfolios in comparison to the outstanding amount increased from 3.49% to 6.2%.¹² Furthermore, while in 1977 only 50 MMFs existed, which held \$4 billion in total assets, by 1982 there were close to 200 funds, holding roughly \$200 billion worth of assets (Hurley, 1982).

The motor force underlying the tremendous growth of MMF portfolios was the interest rate ceilings imposed upon depository institutions in the form of Regulation Q (Hurley, 1982; Peirce and Greene, 2014). (Birdthistle 2010, 1173, 1176) notes once MMFs were able to implement a constant NAV, making them comparable to bank deposits, and “were not restricted by Regulation Q and not subject to insurance premia,” there was “tremendous growth” in the MMF industry. Regulation Q was included in the Glass-Steagall Act of 1933, which consisted of interest rate ceilings placed upon bank deposits. Interest rate ceilings were included in the Act of 1933 to prevent interest rate competition for deposits. In doing so, Regulation Q was able to directly control interest rates on deposit accounts “on the basis of maturities and size” and commercial banks’ rates were set at zero (Raven 1981, 393). Although the intended effect of Regulation Q on reducing competition between depository institutions was achieved, unintended consequences began to emerge in the latter part of the 1960s (Raven, 1981).

Financial innovation of deposit-like products from non-regulated financial institutions placed commercial banks at a disadvantage. Thrift institutions negotiable orders of withdrawal

¹⁰ Federal Reserve Flow of Funds Data, L.121

¹¹ Federal Reserve Flow of Funds Data, L.121

¹² Based upon authors calculation

allowed them to compete for deposits. In order to mitigate this competition the Federal Reserve raised the interest rates thrifts could pay and gave a clear advantage to them over commercial banks (Gilbert, 1986). Additionally, throughout the 1970s, the obstacles facing regulated commercial banks were other financial institutions offering higher yields on “deposits,” such as MMFs (Birdthistle, 2010; Macey, 2011; Miller, n.d.; Raven, 1981).

An unintended effect of the change in Regulation Q during 1966 resulted in the growth of MMFs – more specifically, “when market interest rates were above the ceiling rates, the wealthier investors shifted deposits to money market securities” (Gilbert 1986, 26). The policy the Federal Reserve once believed could stabilize the market began to destabilize the market, which resulted in regulatory arbitrage. Due to the interest rate differentials caused by Regulation Q, investors shifted their funds from depository institutions into MMFs (Gilbert, 1986; Gorton, 2012; Macey, 2011). The rising interest rate environment from 1977 until 1979 reinforced investor inflows to MMFs at a rate of “\$2 billion per month during the first five months of 1979,” which led to an incredible increase in total assets (Gorton and Metrick 2010, 269).

In 1980 Congress modified Regulation Q in “Title II of the Deregulation Act [which] is the Depository Institutions Deregulation Act of 1980 [by means of] ... a six year phase-out on the interest rate restrictions imposed on [regulated banks’] deposits” (Raven 1981, 396). The rise of MMFs is directly attributable to Regulation Q and the proposal of Rule 2a-7 in 1978 – firms were taking advantage of financial innovation to avoid interest rate ceilings, simultaneously taking the form of deposit account equivalents. The competition between thrifts and commercial banks “only became a major threat to the continued existence of the thrift industry in 1981, when over \$109 billion followed in to money market funds, largely supplied by outflows from thrift institutions” (D’Arista 1994, 107).

Examining the composition of MMF portfolios from Quarter 1 of 1979 until Quarter 4 of 1982¹³, we find total assets rose from \$18.020 billion to \$219.928 billion – an increase of 1,934%. The amount of commercial paper held in MMF portfolios, over the same time period, expanded from \$7.012 billion to \$69.112 billion – or, an increase of 885%. While this amount increased significantly it represented a decline from 38.9% of their portfolio to 31.4%. Interestingly enough, the share of commercial paper relative to the amount outstanding increased from 6.2% to 32.6%.¹⁴ Households in Quarter 1 of 1979 held roughly 87% of the

¹³ Federal Reserve Flow of Funds Data, specifically L.121

¹⁴ Based upon authors calculation

shares issued by MMFs, while nonfinancial corporate businesses held 5.7%, life insurance companies 3.7%, and private pension funds around 2.6% of the outstanding shares. By Quarter 4 of 1982, these percentages change only slightly, respectively in the same order as before, the percentages are roughly: 84%, 8.6%, 3.5%, and 2.1%.

Financial institutions responded to the disintermediation caused by MMFs through the creation of conduits issuing ABCP (Anderson and Gascon, 2009; Gorton, 2012, pg. 131). MMFs provided a portion of the financing for securitization through these conduits in which “MMFs became lenders in the repo market, and could accept asset-backed securities as collateral” (Gorton 2012, 131). From this time period onward, MMFs became a core aspect of the shadow banking system.

From 1983 until 1989, MMF assets continued their rapid growth where total assets stood at \$197.336 billion in Quarter 1 of 1983 and had risen to \$385.856 billion in Quarter 2 of 1989.¹⁴ Additionally, commercial paper held in their portfolios represented \$61.832 billion and climbed to \$161.399 billion, corresponding to an increase from 31.33% to 41.82%. Throughout this time period, MMFs held 29.5% of the commercial paper market increasing this figure to 31.61%. Households maintained their holdings of MMF shares in Quarter 2 of 1989, holding roughly 86% of outstanding shares. Nonfinancial corporate holdings fell to roughly 4%, while life insurance company holdings fell to a little over 1% of outstanding shares, and finally, private pension funds slightly increased their holdings to roughly over 4%.¹⁵

There is justification in reviewing the composition of MMF portfolios in Quarter 2 of 1989, due to the fact that commercial paper defaults were increasing in the middle of 1989 and 1990 (Anderson and Gascon, 2009; Post, 1980; Macey, 2011). The first commercial paper default came in 1989, in which \$213 billion of commercial paper from a single issuer became worthless and the sponsors of the fund covered the loss to maintain the \$1.00 NAV. In aggregate, \$883 million of commercial paper defaulted in 1989 and 1990, which prompted “the SEC to amend Rule 2a-7 to add a requirement that a money market fund invest no more than 5% of its assets in second-tier [paper that does not hold the highest rating, such as AAA] commercial paper and at most 1% of its assets in the paper of any particular second-tier issuer” (Macey 2011, 159-160).¹⁶ Additionally, within the 1991 revisions to Rule 2a-7, the SEC

¹⁵ Federal Reserve Flow of Funds Data, L.206 (Q)

¹⁶ Kacperczyk and Schnabl (2010) as well as Post (1980) also mention the amendments to Rule 2a-7 in 1991 as well.

differentiated between first- and second-tier paper; where, first-tier paper was rated of highest quality by at least two national statistical rating agency organizations (NSRSOs) and second-tier paper only required one rating agency to provide the highest rating (Post, 1980).

In response to the SEC revisions to Rule 2a-7 the portfolios of MMFs, in the aggregate, saw a decrease in their holdings of medium-term paper (second-tier) from 8% in 1989 to near 0% by the end of 1991 (Post, 1980). If an MMF did not meet the new requirements set forth by the SEC in the revision to Rule 2a-7, it could no longer identify as an MMF because it was not abiding by the Investment Company Act, which governs MMFs (Macey, 2011). There were no other major events occurring with respect to the MMF industry other than Community Bankers U.S. Government Fund, which failed in 1994 (Cochran, Freeman, and Mayer Clark 2015).

Despite defaults within the commercial paper market there was no effect on MMF portfolios in the aggregate, since they increased their holdings of commercial paper in Quarter 3 of 1989 to \$174.914 billion – an increase of roughly 8.3% from Quarter 2 of 1983.¹⁷ Total assets grew from \$430.007 billion in Quarter 4 of 1989 to \$2.338 trillion in Quarter 4 of 2006. As will be seen in Chapter 2, the growth of total assets within the MMF industry still achieved a tremendous upward trajectory, which culminated in the Global Financial Crisis – with MMFs directly at the center. During the same time period, the holdings of commercial paper within MMF portfolios grew from \$187.788 billion to \$613.993 billion – again, there was still growth left within the cycle until the Global Financial Crisis. The share of paper held in their portfolio declined from 43.6% to 26.2%. Finally, they held 36.3% of the commercial paper market at the end of 1989 and by 2006 this figure had not changed.¹⁸

Household holdings of MMF shares began the decline while other financial institutions picked up the slack. In Quarter 4 of 1989, households held roughly 88% of the total shares outstanding, nonfinancial corporate firms held 3.7%, life insurance companies 1.2%, and private pension funds 4.3%. Households in 2006 reduced their holdings of MMF shares *directly*, to an aggregate holding of roughly 62%, while nonfinancial corporate firms increased to 18%. Additionally, by Quarter 4 of 2006, life insurance companies held roughly 2.4%, and private pension funds held roughly 6.3% of outstanding shares.¹⁹ MMFs total assets continued to increase in the run up to the financial crisis of 2007-2009 as will be seen in Chapter 2.

¹⁷ Federal Reserve Flow of Funds Data, L.121

¹⁸ Based upon authors calculation

¹⁹ Based upon authors calculation

CHAPTER 2: MMFS THROUGHOUT THE CRISIS; SEC REFORMS OF 2010 & 2014; ANALYSIS OF REFORMS

MMF assets continued to rise in 2007 from \$2.417 trillion to \$3.085 trillion. The share of open market paper in MMF portfolios also increased during the same time period, increasing from \$643.685 billion to \$688.437 billion. Additionally, the ABCP market showed considerable weakness throughout 2007 due to the subprime crisis, in which issuers were finding it difficult to rollover their paper and two programs subsequently defaulted during August of 2007 (McCabe, 2010). To be more precise, roughly a quarter of the ABCP programs could not rollover their paper during August of 2007 and MMFs began withdrawing from the market (Peirce and Greene, 2014). During 2007, ABCP fell from \$1.090 trillion to \$801.681 billion indicating the turmoil within this segment of the financial system.²⁰

Inherent signs of weakness should have signaled to MMFs holding ABCP to start divesting their portfolios or to refuse to rollover the paper, however, the yield chasing strategies discussed in Chapter 1 were implemented by one fund in particular – the Reserve Primary Fund. To ensure sales in the presence of instability in the subprime market ABCP conduits – the collateralizers of subprime mortgages, increased interest rates throughout 2007, in particular in August, in comparison to other assets (Kacperczyk and Schnabl, 2013; Scharfstein, 2012). Some MMFs saw higher yields as an opportunity to attract new investors, simultaneously increasing the assets within their portfolios, due to the fact they could offer higher yields on their shares in comparison to other MMFs offering lower yields.

Yield chasing, through purchasing increasingly risky ABCP, was met with the expected results, such that “MMFs [specifically, Reserve Primary Fund] invested in risky asset-backed commercial paper were able to offer higher yields and grow their assets by close to 60% from August 2007 to August 2008...”²¹ The higher yields came at a price in the form of substantially increasing risk due to holdings of ABCP. Reserve Primary Fund implemented this yield chasing strategy and dropped traditional money market instruments from its portfolio in favor of ABCP. Reserve Primary increased its holdings of Lehman Brothers commercial paper in November of 2007 to \$375 million and further increased its holdings of Lehman paper to \$775 million by 2008 – representing roughly 1% of its portfolio (Cochran, Freeman, and Mayer Clark 2015;

²⁰ <https://fred.stlouisfed.org/series/ABCOMP>

²¹ (Hanson et al, 2014, 8)

Macey, 2011; Kacperczyk and Schnabl, 2013). Before Reserve Primary Fund implemented its yield chasing strategy it only held one percent of its *total* assets in commercial paper a year prior, but once they increased their holdings of ABCP the fund was able to move “to the top ten percent of institutional funds,”²² with respect to the yield they could offer to investors. Over the same time period, Reserve Primary was seeing tremendous asset growth within its portfolio – almost doubling throughout 2008 to \$125 billion (Macey, 2011; Peirce and Greene, 2014).

The crisis of the U.S. financial system commenced in Quarter 4 of 2007 and according to the National Bureau of Economic Research, lasted until Quarter 2 of 2009.²³ Although there were substantial developments occurring we are concerned with the collapse of Lehman Brothers commercial paper which had an instantaneous negative impact on MMF portfolios on September 15, 2008. Lehman Brothers filed for bankruptcy sending shockwaves throughout the financial system. The tidal wave to smash upon the MMF industry was centered on the Reserve Primary Fund, which was the first fund to fail since 1994. The irony of Reserve Primary being the first to fail during the Global Financial Crisis is that it was the first MMF to be created.

Lehman’s bankruptcy had a direct effect on the Reserve Primary Fund’s asset value producing a markdown of \$775 million Lehman paper to \$0. The result was the loss of roughly 1% of its assets and to a re-pricing of shares at amortized cost valuation to \$0.97 (Anderson and Gascon, 2009; Bernanke, 2013, Birdthistle, 2010; Cochran, Freeman, and Mayer Clark 2015; Felkerson, 2012; Guttman, 2009; Macey, 2011; McCulley, 2010; Peirce and Greene, 2014; Schapiro, 2012). This meant RPF could no longer guarantee shareholders the \$1.00 NAV of their shares – if an investor put \$1 into the fund, they could only receive \$0.97 in return.

Reserve Primary Fund losses were further aggravated by Lehman’s collapse, which led to a redemption run on RPF specifically “60% [of the shares outstanding], reducing its [total] assets to \$23 billion” (Macey 2011, 145). Once Reserve Primary failed, contagion hit other MMFs with a tsunami of investor redemptions. The severity of redemptions once Reserve Primary failed resulted in \$349 billion dollars in redemptions in the following week (Bernanke, 2010, 2013; Birdthistle, 2010; Cochran, Freeman, and Mayer Clark 2015; Duygan-Bump, Parkinson, Rosengren, et al, 2013; Felkerson, 2012; Kacperczyk and Schnabl, 2010; Scharfstein, 2012).

²² (Peirce et al, 2014, 12)

²³ <https://www.nber.org/cycles/cyclesmain.html>

Following the failure of Reserve Primary, MMFs met investor redemption requests required asset sales – namely, commercial paper at dramatically declining prices (Birdthistle, 2010; Gorton and Metrick, 2010; Moody’s Investors Services, 2010; Peirce and Greene, 2014). MMFs sales of commercial paper in order to meet redemption requests led to an order imbalance that closed the commercial paper market (Bernanke, 2013; Birdthistle, 2010; Cochran, Freeman, and Mayer Clark 2015; Fisch, 2015; Guttman, 2009; Miller, n.d.). The behavior of investors in retail and institutional MMFs was crucial to understanding the run; specifically, institutional investors were the dramatic sellers of MMF shares throughout the run. Peirce and Greene (2014) and Scharfstein (2012) note that throughout September of 2008 institutional MMFs lost 30 percent of their assets, while retail MMFs witnessed a decline of only five percent. Additionally, McCabe (2010) notes throughout the run on MMFs, institutional investors were redeeming their shares ten times faster than retail investors. Although there is no consensus on the precise difference between institutional and retail investors’ redemptions – it is certain institutional investors were the driving force behind the run.

Forced asset liquidation to meet redemption requests was not the utmost concern to MMFs during these few days – maintaining their constant NAV was also crucial for their survival. Since MMFs must use amortized cost valuation to determine their NAV, they must also calculate their shadow NAV. Usually, the shadow NAV will be exactly the same as the constant NAV during normal periods, however, during times of crisis this difference may be significant since the shadow NAV is calculated based upon mark-to-market accounting. Therefore, during the redemption run on MMFs, funds that had no redemption requests nevertheless had to mark down their shadow NAV to include the current market prices of assets within their portfolios which could have generated heightened redemption requests due to the divergence between the two NAVs (Fisch, 2015).

Sponsor support became crucial to maintenance of the \$1.00 NAV during the Global Financial Crisis. Moody’s Investors Services (2010) notes that 36 funds were provided with support during the crisis and (McCabe et al, 2012) provide a figure of 47 funds throughout the crisis. Additionally, Brady et al (2012) demonstrates that 21 prime funds would have broken the buck without support and 31 prime funds would have broken the buck if sponsors had not provided support multiple times. (Brady, Anadu, and Cooper 2012, 4) also conclude total support represented roughly “\$4.4 billion, [which was] provided to at least 78 funds ... [which] occurred in 123 instances with 32 funds receiving support in multiple reporting periods.”

Former Chairman of the SEC, (Schapiro 2012, 6) states in a testimony: “More than 100 funds were bailed out by their sponsors during September 2008.” As can be seen, MMFs holdings of deteriorating ABCP led to redemption requests resulting in forced asset sales, further leading to sponsors having to play a dominant role throughout the crisis. The defining moment for MMFs throughout the Global Financial Crisis came in the form of government intervention by the Federal Reserve as well as the U.S. Treasury to stop the run on MMFs in the aftermath of the Reserve Primary Fund’s breaking the buck.

The run on MMFs lasted only a couple of days following the suspension of redeemability by Reserve Primary Fund. The run was halted on September 19, 2008, with the implementation of the Temporary Guarantee Program by the U.S. Treasury and the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (“AMLF”) enacted by the Federal Reserve (Kacperczyk and Schnabl, 2010). The Temporary Guarantee Program was a backstop for the MMF industry and arguably was put in place to protect shareholders. Despite the questionable circumstances with respect to the reasons for each of the programs they were effective in stymying the run on MMFs. The following week since the introduction of the two programs, beginning Monday September 22, 2008, redemption requests were reduced to roughly \$22 billion (RPWG, 2010).

In order for an MMF to participate in the Temporary Guarantee Program the fund had to be in compliance with Rule 2a-7 prior to September 19, 2008, and the program only “insured” outstanding shares purchased on or before September 19, 2008. In addition to being in compliance with Rule 2a-7 an MMF was also required to pay a fee into the Program in order for the Treasury to fully guarantee the outstanding shares. Furthermore, an MMF that had broken the buck or had suspended redemptions was eliminated from participating in the Program. The Treasury funded the Temporary Guarantee Program with \$50 billion through the Exchange Stabilization Fund, which was enacted in 1934 with the Gold Reserve Act. The Treasury’s Program earned roughly between \$1.1 and \$1.2 billion in fees which “included 1,486 MMMFs with \$3.2 trillion in assets, or 93% of the assets in the MMMF market,” however, the Program was not drawn upon by any participating MMF and ended on September 18, 2009 (McNamara 2016, 4). The Temporary Guarantee Program was a backstop for the MMF industry and arguably was put in place to protect shareholders (Cochran, Freeman, and Mayer Clark 2015; McNamara, 2016; Pierce and Greene, 2014).

The AMLF was also created on September 19, 2008, by which the Federal Reserve granted “nonrecourse loans at the primary credit rate to U.S. depository institutions and bank holding companies to finance their purchases of high-quality asset-backed commercial paper ...” from MMFs holding this paper (Federal Reserve 2009, 53). The AMLF had a dual purpose: to provide liquidity to the ABCP market and to allow MMFs to meet redemption requests by creating a “market” in which the paper could be sold from the MMFs portfolios (Federal Reserve 2009, 53). In order for an MMF to sell ABCP to a depository institution within the AMLF program, the MMF had to have owned the paper prior to the inception of the program on September 19, 2008 (Anderson and Gascon, 2009). Unlike the Temporary Guarantee Program, lending through the program reached roughly \$150 billion in which “the ABCP pledged as collateral for AMLF loans amounted to roughly 22% of all ABCP outstanding” within a few weeks of its introduction (Duygan-Bump, Parkinson, Rosengren, et al, 2013, 723). The AMLF witnessed 105 MMFs participate in the AMLF whereby the Fed issued roughly \$217 billion in non-recourse loans. The intended effect of the creation of the AMLF by the Federal Reserve achieved its goal, providing liquidity to the ABCP market as well as lowering the spreads of ABCP (Duygan-Bump, Parkinson, Rosengren, et al, 2013; Felkerson, 2012).

Since a clear exposition of MMFs throughout the Global Financial Crisis has been provided, an examination of the financial composition of MMFs throughout this time period is in order. Total assets of MMFs from Quarter 4 of 2007 until Quarter 2 of 2009 increased from roughly \$3.08 trillion to \$3.65 trillion.²⁴ It is interesting to note, total assets reached their all-time peak during the financial crisis, in Quarter 1 of 2009, where they were roughly \$3.81 trillion.²⁵

As we have seen, open market paper²⁶, specifically commercial paper, grew essentially in tandem with the growth of MMFs – the opposite is also true as commercial paper declined throughout the crisis. Open market paper outstanding during the beginning of the crisis – Quarter 4 of 2007 – stood at roughly \$1.521 trillion, while commercial paper outstanding stood at roughly \$1.520 trillion.²⁷ Open market paper and commercial paper became closer in the total outstanding amount between the two due to the sharp decline in the issuance of bankers

²⁴ Federal Reserve Flows of Funds, L.121

²⁵ Federal Reserve Flow of Funds, L.121

²⁶ Open market paper within flow of funds data is financial commercial paper, nonfinancial commercial paper, and bankers’ acceptances issued by private depository institutions calculated from Federal Reserve Flow of Funds, L. 208.

²⁷ Federal Reserve Flow of Funds, L.208

acceptances issued by depository institutions in the lead up to the financial crisis. However, throughout the crisis there is no discernible pattern to bankers' acceptances being issued by depository institutions. Open market paper outstanding in Quarter 2 of 2009 roughly stood at \$1.012 trillion while the outstanding amount of commercial paper was roughly \$1.011 trillion.²⁸

The amount of open market paper held by MMFs at the beginning of the financial crisis in Quarter 4 of 2007 was roughly \$688.437 billion and declined to roughly \$538.694 billion in Quarter 2 of 2009. Throughout the financial crisis open market continued to decline within MMF portfolios, except for an increase in Quarter 3 of 2008 of \$506.003 billion to \$632.716 billion in Quarter 4 of 2008. After this increase, open market paper continued its downward decline within MMF portfolios *during* the financial crisis. The increase of commercial paper holdings from Quarter 3 of 2008 to the next Quarter 4 of 2008 is significant because, as we saw before, Quarter 4 of 2008 is when MMF assets were the largest they had ever been. We can conclude that even with the turmoil erupting in the financial markets, open market paper was still in demand by MMFs. It is also interesting to note that Quarter 3 of 2008 is when Reserve Primary broke the buck and MMFs still increased their holdings of open market paper from Quarter 3 of 2008 to Quarter 4 of 2008.

Examining only the amount of open market paper held within MMF portfolios is insufficient to comprehend the risks facing MMFs throughout this time period. The total percentage of open market paper outstanding held within MMF portfolios during Quarter 4 of 2007 was roughly 45.24% and this figure increased to 53.21% in Quarter 2 of 2009.²⁹ The underlying risk for MMFs during the financial crisis was that open market paper was shrinking faster (the denominator is declining more quickly in comparison to the numerator) than MMFs holdings of open market paper – therefore, concentration risk was becoming apparent. Even though MMFs divested their portfolios (in the aggregate and in dollar terms) of open market paper, the market itself withered away quicker than MMFs could dispose of it.

Throughout the financial crisis MMFs rapidly increased their holdings of Treasury securities – in Quarter 4 of 2007 MMFs held \$181.813 billion within their portfolio; by Quarter 2 of 2009 MMFs had increased their holdings to \$500.464 billion. Put another way, MMFs held only roughly 5.89% of their portfolio in Treasury securities in Quarter 4 of 2007 and had increased this percentage to roughly 13.69% of their portfolio in Quarter 2 of 2009. In a similar

²⁸ Federal Reserve Flow of Funds, L.208

²⁹ Based upon authors calculation

vein, MMFs held roughly \$240.714 billion of agency and GSE-backed securities in their portfolios in Quarter 4 of 2007 and had increased this holding to an estimated \$757.788 billion in Quarter 2 of 2009. Similarly, MMFs increased the percentage of holdings of agency and GSE-backed securities from roughly 7.8% in Quarter 4 of 2008 to 20.74% in Quarter 2 of 2009. Additionally, MMFs held roughly \$497.195 billion of municipal securities within their portfolios in Quarter 4 of 2007 and had decreased this holding to \$474.812 billion in Quarter 2 of 2009. Municipal securities, as a percentage of portfolio holdings in Quarter 4 of 2007 represented roughly 16.11% of their portfolio and in Quarter 2 of 2009 had come to represent roughly only 12.98% of their portfolio.³⁰

Security repurchase agreements also declined within MMF portfolios throughout the financial crisis – starting their decline in Quarter 4 of 2007 where they stood at \$618.354 billion. By Quarter 2 of 2009 they were \$499.161 billion. The decline of security repurchase agreements within MMF portfolios shrank from roughly 20.03% of MMF portfolios in Quarter 4 of 2007 to roughly 14.75% in Quarter 2 of 2009. Corporate and foreign bonds also declined in MMF portfolios throughout the crisis, declining from \$384.558 billion in Quarter 4 of 2007 to \$202.480 billion in Quarter 2 of 2009. Corporate and foreign bonds represented roughly 12.46% of MMF portfolios in Quarter 4 of 2007 and declined to roughly 5.54% in Quarter 2 of 2009.³¹ Additionally, unidentified miscellaneous assets were also dramatically reduced within MMF portfolios – in Quarter 4 of 2007 they stood at \$70.454 billion and by the time of Quarter 2 of 2009 they were \$38.828 billion. In Quarter 4 of 2007 unidentified miscellaneous assets represented a miniscule portion of MMF portfolios, roughly 1.70% and had been reduced to roughly 1.06% of the portfolio in Quarter 2 of 2009.³²

Private foreign deposits within MMF portfolios were \$102.250 billion in Quarter 4 of 2007 and had declined to \$89.432 billion in Quarter 2 of 2009. Private foreign deposits once represented roughly 3.31% of MMF portfolios in Quarter 4 of 2007 and had declined to roughly 2.44% in Quarter 2 of 2009. Checkable deposits and currency represented \$1.923 billion in Quarter 4 of 2007 and were roughly -\$7.137 billion in Quarter 2 of 2009.³³ In percentage terms, checkable deposits and currency were also miniscule within MMF portfolios in Quarter 4 of

³⁰ Federal Reserve Flow of Funds, L.121

³¹ Based upon authors calculation

³² Federal Reserve Flow of Funds, L.121.

³³ Federal Reserve Flow of Funds, L.121 (The number is negative due to liabilities exceeding assets. For an explanation of the negativity within the number see:

<https://www.federalreserve.gov/apps/fof/SeriesAnalyzer.aspx?s=FL633020000&t=L.121&suf=Q>

2007 representing roughly 0.06% and had further declined to -0.19% in Quarter 2 of 2009. Finally, total time and savings deposits stood at \$300.062 billion in Quarter 4 of 2007 and had risen to \$559.209 billion in Quarter 2 of 2009. Again, total time and savings deposits within MMF portfolios were considerable; in Quarter 4 of 2007 they represented roughly 10.26% of total assets and in Quarter 2 of 2009 roughly 15.30% of MMFs portfolios.

MMF portfolios were dramatically altered throughout the financial crisis – especially since MMFs were shifting into safer assets within their portfolios, such as U.S. Treasuries. After the crisis was “over” in Quarter 2 of 2009, the SEC was already forming new regulations to impose upon the MMF industry. The first set of reforms were implemented in 2010 and the remaining followed in 2014. Since the 2010 reforms were implemented shortly after the crisis we will briefly examine these.

The 2010 reforms targeted the types of securities held in MMF portfolios as well as the reference to credit ratings on securities. Reforms were also aimed at altering the maturity of MMF portfolios along with changing the liquidity levels of MMF portfolios. Additionally, the SEC now requires MMFs to stress test their funds, determine the counterparty risk involved in security repurchase agreements, enhances disclosure requirements, and allows MMFs to alleviate difficulties due to investor redemption requests through granting MMFs permission to suspend redemptions if the fund has or is at risk of breaking the buck. Each of these reforms will be summarized briefly in order of appearance below.

The types of securities MMFs hold in their portfolios are crucial in determining the yield a fund can offer to investors. Regulations differentiate between first- and second-tier securities in which a first-tier security is a security with a maturity of less than 397 days until maturity, has been given the highest rating by a nationally recognized statistical rating organization (“NRSRO”) or is an unrated security comparable to a rated security under the MMFs approval, or is a security “issued by a registered investment company that is a money market fund, or is a government security” (SEC 2010, 180). A second-tier security is not a first-tier security per the definition within the 2010 reforms and by the SEC reforms holdings of MMFs second-tier securities that can be held within their portfolio were lowered from five to three percent.

Lowering the amount of second-tier securities within MMF portfolios as argued by the SEC is due to the fact “that second tier securities trade in thinner markets, generally have a weaker credit profile, and exhibited credit spreads that widened more dramatically than those of first tier securities during the 2008 financial turmoil,” namely risky ABCP (SEC 2010, 12). The

SEC also notes that during economic downturns, second-tier securities can become relatively illiquid in comparison to first-tier securities in which the prices of second-tier securities are markedly reduced from those of first-tier securities. One of the main arguments by the SEC is that the reduction of second-tier securities within MMF portfolios will reduce the risk they are subject to since they will be exposed to a smaller amount of these securities. BlackRock, within its comment letter on the 2010 reforms, supported the full elimination of MMFs holding second-tier securities, while the comment letter submitted by the American Securitization Forum disputed the elimination of MMFs being allowed to hold second-tier securities.

An MMF must reduce its holdings of a second-tier security from one to one-half percent or \$1 million, the greater of the two, from any single issuer. Again, this a risk-limiting constraint imposed upon MMFs by the SEC in order to mitigate MMFs diversifying second-tier securities in a multitude of different issuers within their portfolios. Furthermore, MMFs can only invest in second-tier securities which have a remaining maturity of less than 45 days in order to reduce exposure to these securities. The SEC argues the reduction of a remaining maturity of less than 45 days will ameliorate the credit and liquidity risk these securities pose to MMF portfolios.

MMFs referring to credit ratings given by NRSROs were also altered in revisions to Rule 2a-7 in which an MMF must “designate four or more NRSROs, any one or more of whose short-term credit ratings the fund would look to under the rule in determining whether a security is an eligible security,” and whether the NRSROs are providing reliable ratings (SEC 2010, 22-23). The SEC highlighted concerns about the reliance on credit ratings by MMFs due to the fact that a credit rating acted as “an official seal of approval” throughout the financial crisis (SEC 2010, 23). However, the SEC argued removing reference to credit ratings would place considerable reliance upon the MMF board in determining whether a security presents minimal credit risk to the fund. Therefore, allowing MMFs to continue to rely upon NRSROs for credit ratings constrains the risks any one fund is able and willing to take. To avoid MMFs switching between NRSROs, once an MMF designates an NRSRO it is not allowed to drop it for another NRSRO. Additionally, an MMF is only allowed to determine whether a security is rated, unrated, first- or second-tier in reference to the designation given to that security by the NRSRO.³⁴

³⁴ An unrated security is classified as unrated “if neither the security nor its issuer has received a short-term rating from any of the designated NRSROs.... [and] before investing in [a second tier-] security, the fund adviser must make a determination that the security is of comparable quality to a rated security” (SEC 2010, 34-35).

A minor, but significant, reform granted, rather than imposed, upon MMFs is the allowance of these funds to purchase unrated asset-backed securities (“ABS”). The stipulation is that the unrated ABS must meet the requirements of an unrated security under Rule 2a-7. SEC reasoning underlying this is that NRSROs downgraded almost all ABS throughout the financial crisis, therefore, reliance upon NRSROs ratings would do no justice, which is puzzling since we just witnessed MMFs being required to designate at least four NRSROs in reference to credit ratings. The SEC is restricting an MMF that wishes to purchase an unrated ABS to perform due diligence on the unrated ABS, specifically it must “analyze the underlying ABS assets to ensure that they are properly valued and provide adequate asset coverage for the cash flows required to fund the ABS under various market conditions; analyze the terms of any liquidity or other support provided by the sponsor of the ABS; and otherwise perform legal, structural, and credit analyses required to determine that the particular ABS involves appropriate risks for the money market fund” (SEC 2010, 37).

Due to the severity of the financial crisis affect upon a majority of MMFs portfolios the SEC is requiring MMFs to alter the composition of their portfolios in order to be “less risky.” In order to accomplish this feat, the SEC is requiring MMFs to shorten the maturity length of portfolios to alleviate investors from being subject to “interest rate risk, spread risk, and liquidity risk” (SEC 2010 37). This will be accomplished by reducing the weighted average maturity (“WAM”) of an MMF to 60 days from 90 days. This reduction in the WAM is to provide an MMF further stability in order to price its share at its constant NAV. According to the SEC, a reduction in the WAM will minimize fluctuations in interest rate changes and alleviate the run-like behavior of investors witnessed in the financial crisis. Also, according to the SEC, the implementation of a 60-day WAM will enable a MMF to confront a series of negative events within its portfolio before failing becomes a possibility. The SEC concluded an MMF portfolio that witnessed an interest rate change of three percentage points within its portfolio accompanied with a WAM of 60 days would not be in danger of failure.

Complementary with the reformed WAM limitations, the SEC also enacted a weighted average life (“WAL”) of an MMF portfolio up to, but not exceeding, 120 days. The purpose of the WAL requirement is to “limit the portion of a fund’s portfolio that could be held in longer term adjustable-rate securities” (SEC 2010, 37). MMFs abiding by Rule 2a-7 WAM requirements are still subject to spread risk with respect to longer-term adjustable-rate securities. Therefore, the SEC imposed the new requirement of a WAL in order to alleviate spread risks

MMFs may face when investing in longer adjustable-rate securities. Since the WAL will, according to the SEC, reduce spread risks MMFs face, it will also protect investors in stressful market conditions due to a decreased volatility of MMF portfolios.

Tightened liquidity standards for MMF portfolios were also implemented in the 2010 reforms. First and foremost, the SEC now require MMFs to “maintain a sufficient degree of liquidity necessary to meet reasonably foreseeable redemption requests” by investors in times of market stress to mitigate the risks of selling assets into illiquid markets (SEC 2010, 50). The SEC amended Rule 2a-7 so the MMFs could comply with the new liquidity requirements. Additionally, a MMF must hold a sufficient amount of liquid securities to meet shareholder redemptions if such redemptions were to occur. A MMF will determine the sufficient amount of liquidity by analyzing the composition of investors which have invested in the fund – therefore, some funds may have lower liquidity levels than others due to the characteristics of the fund’s investors. Essentially, the SEC is basing liquidity requirements on whether a fund has more institutional investors or retail investors, since institutional investors are more willing to run in times of market stress than retail investors.

In order for MMFs to have sufficient liquidity, the SEC is further requiring funds to “maintain a portion of its portfolio in cash and securities that can readily be converted into cash” (SEC, 2010, 56). In doing so, an MMF must retain, at a minimum, ten percent of its assets in daily liquid assets and thirty percent of its assets in weekly liquid assets.³⁵ In order for an asset to satisfy either of these daily or weekly requirements, the asset must be “only cash or securities that can readily be converted to cash...” (SEC 2010, 57). Daily and weekly liquidity requirements are subject to both institutional and retail MMFs. Daily and liquidity requirements set forth by the SEC are stringent upon the MMF industry. For example, “no *taxable* [prime] money market fund can acquire any security other than a daily liquid asset if, immediately after acquisition, the fund would have invested less than 10 percent of its total assets in daily liquid assets and no money market fund can acquire any security other than a weekly liquid asset if,

³⁵ Daily liquid assets are defined as “cash (including demand deposits), Treasury securities, and securities (including repurchase agreements) for which a money market fund has a legal right to receive cash in one business day” (SEC 2010, 64). Weekly liquid assets are defined as “cash, direct obligations of the U.S. Government, Government securities that are issued by a person controlled and supervised by and acting as an instrumentality of the Government of the United States pursuant to authority granted by the Congress of the United States that: are issued at a discount to the principal to be repaid at maturity, have a remaining maturity date of 60 days or less; or securities that will mature or are subject to a demand feature that is exercisable and payable within five business days” (SEC 2010, 183).

immediately after the acquisition, the fund would have invested less than 30 percent of its total assets in weekly liquid assets” (SEC 2010, 60).

The financial crisis was recent and on the mind of regulators; therefore, the reasoning behind the daily and weekly liquid assets was for MMFs to be able to meet redemption requests, should such a run occur again. The wording as well as the analysis provided by the SEC when speaking of redemptions during a crisis seems schizophrenic, however, was well justified due to the devastation the run on MMFs caused the overall financial markets. Thus, the liquidity levels are set “high,” according to the SEC, in order for MMFs to withstand redemptions and to effectively mitigate liquidity risks.

Liquidity of certain securities, such as ABCP, throughout the financial crisis became a significant complication – therefore, the SEC amended Rule 2a-7 further which restricted MMFs from acquiring only five percent of its total assets in illiquid securities.³⁶ Underlying the SEC’s decision to reduce the amount of illiquid securities in MMF portfolios was the ability of MMFs to meet redemption requests along with mitigating liquidity risks an MMF may encounter when holding illiquid securities. However, the SEC notes that even liquid securities, such as ABCP, can become illiquid in times of market stress and “in light of the risk that liquid assets would become illiquid thereby impairing the ability of a money market fund to meet redemption demands, we proposed to prohibit funds from acquiring securities that were, at the time of their acquisition, already illiquid” (SEC 2010, 54). Wherefore, if an illiquid security becomes liquid – the MMF can purchase the asset, which will not be considered an illiquid security at the time of purchase since the security was liquid. Combining the daily and weekly liquidity requirements along with a reduction of illiquid securities holdings within MMF portfolios we find the SEC allowed holdings of illiquid securities within their portfolios due to increased daily and weekly liquidity requirements.

MMFs are now required to stress test their funds, which must “include an increase in short-term interest rates, and increase in shareholder redemptions, a downgrade of or default on portfolio securities, and widening or narrowing of spreads between yields on an approximate benchmark selected by the fund for overnight interest rates and commercial paper and other types of securities held by the fund” and must also include “the magnitude of each hypothetical event [being tested on the fund’s portfolio] that would cause the money market fund to break the

³⁶ An illiquid security is “a security that cannot be sold or disposed of in the ordinary course of business within seven days at approximately the value ascribed to it by the money market fund” (SEC 2010, 55-56).

buck [and] an assessment by the fund’s adviser of the fund’s ability to withstand the events ... that are reasonably likely to occur within the following year” (SEC 2010, 67-69). However, the SEC permits each fund to create its own stress tests as each test will be based upon the holdings of securities within the funds portfolio.

According to the SEC, repurchase agreements provide MMFs with significant amounts of liquidity. Therefore, MMFs may now invest only “in repurchase agreements collateralized by cash items or Government securities [...]” (SEC 2010, 70). The reasoning behind the SEC altering MMFs collateral within repurchase agreements is due to the risk of counterparty default leading to the fund potentially selling the collateral at a loss. Additionally, an MMF must also determine the creditworthiness of the counterparty with respect to each repurchase agreement it invests in; essentially to avoid an MMF taking on another Lehman Brother’s as its counterparty.

Disclosure requirements were also an integral segment of the 2010 reforms. MMFs are now required to disclose information on their websites regarding the securities within their portfolios. The fund must disclose each security it holds, the issuer of the security, “the category of investment (*e.g.*, Treasury debt, government agency debt, asset backed commercial paper, structured investment vehicle), the CUSIP number, the principal amount, the maturity date as determined under rule 2a-7 for purposes of calculating weighted average maturity, the final maturity date, if different from the maturity date previously described, coupon or yield, and amortized cost value” (SEC 2010, 75). Additionally, funds must report both their WAM and WAL calculations for each month in Form N-MFP. Furthering disclosure requirements, the SEC has required MMFs to file Form N-MFP with the SEC, which is available on EDGAR. In addition to the items displayed on MMFs websites, Form N-MFP must also include: “the title of the issue, including coupon or yield ... the NRSROs designated by the fund, the credit ratings given by each NRSRO, and whether each security is first tier, second tier, unrated, or longer eligible, the maturity date as determined under rule 2a-7, taking into account the maturity shortening provisions of rule 2a-7(d), the final legal maturity date, taking into account any maturity date extensions that may be effected at the option of the issuer, whether the instrument has certain enhancement features, the current amortized cost value, the percentage of the money market fund’s assets invested in the security, [and] whether the security is an illiquid security” (SEC 2010, 78-80) Finally, Form N-MFP must also include the market price of each security and the funds net asset value. The SEC is allowing a grace period of 60 days of publication of Form N-MFP.

According to the SEC, Form N-MFP will provide better information to the SEC on the riskiness of funds and whether or not a fund is on the brink of breaking the buck. Since funds will have to disclose vital information about their portfolio the SEC appears to believe this will constrain risk-taking among MMFs. Additionally, the SEC argues that shareholders will become better informed of the inherent risks within MMFs by gaining an understanding of MMFs portfolio composition via Form N-MFP data. Along similar lines, investors will benefit from being able to obtain specific funds net asset value at all times.

Rule 22e-3 was implemented in the 2010 reforms, which allows the board of directors of a fund to suspend redemptions in order to execute an orderly liquidation process. Rule 22e-3 can only be invoked to allow the fund to liquidate its portfolio. The intention of Rule 22e-3 is to mitigate negative effects to shareholders from redemptions and to provide stability to the fund itself during liquidation. Specifically, Rule 22e-3 can be invoked “if the fund’s board ... determines that the deviation between the fund’s amortized cost price per share and the market-based net asset value per share may result in material dilution or other unfair results, the board ... has approved the liquidation of the fund ... and, the fund prior to suspending redemptions, notifies the Commission of its decision to liquidate and suspend redemptions” (SEC 2010, 97-98).

The 2010 reforms implemented by the SEC were only the first of two sets of reforms imposed upon the MMF industry. The SEC believed the 2010 reforms would achieve the goals of “mak[ing] money market funds more resilient to risks in the short-term debt markets, and to provide greater protection for investors in a money market fund that is unable to maintain a stable net asset value,” however, the SEC came to believe more reforms were necessary, as witnessed in 2014, in order to fully achieve this goal (SEC 2010, 104).

The goal of the 2014 reforms was to reduce the risk of investor redemptions in times of market stress. In 2014 the SEC implemented a floating NAV for prime institutional MMFs, liquidity fees and redemption gates, enhanced disclosure requirements, diversification requirements, and enhanced stress-testing requirements. Each of the reforms implemented by the SEC in 2014 will be analyzed briefly in order of appearance.

The SEC believed a constant NAV for prime institutional funds might be harmful to investors due to redemption risk since price variations within MMF portfolios could possibly cause investors to flee from funds when there was a perceived chance of failure. Prime institutional MMFs are thus required to transact at a floating NAV. Price fluctuations in the

underlying securities will be readily apparent since mark-to-market accounting underlies the pricing of shares for funds using a floating NAV, unlike amortized cost valuation currently used by funds employing a constant NAV. The floating NAV reform applies to prime institutional MMFs since these investors are the most prone to run in times of market stress and also tax-exempt MMFs, more commonly known as municipal MMFs. A floating NAV will allow investors to buy and redeem shares based upon the current floating NAV “price.” Supporting the SEC’s decision for prime institutional MMFs to use a floating NAV were Goldman Sachs, Schwab, T. Rowe Price, Vanguard, and CFA. Unlike the 2010 reforms, which became effective immediately, prime institutional funds who employ a constant NAV have two years before they are mandated to transition to a floating NAV. Thus, all prime institutional MMFs have to begin pricing their shares according to a floating NAV in 2016.

There are two ulterior motives to the SEC’s decision mandating prime institutional MMFs to transact at a floating NAV. Investors undertaking a first-mover advantage strategy characterizes the first line of reasoning of the SEC’s implementation of a floating NAV for prime institutional funds. The shadow price of MMFs net-asset values fluctuate even though the fund implements a constant NAV. Deviations in the shadow NAV could possibly lead to investors witnessing higher-than-usual fluctuations in the shadow NAV and redeeming their shares. If enough investors undertake this strategy, a run on the fund is imminent because investors can witness a shadow price, of say \$0.9996, and redeem all of their shares at a constant value of \$1.00 since the MMF “promised” a dollar-in-dollar-out value with the use of a constant NAV. Supposedly, a floating NAV will mitigate this problem. This is the case because the floating NAV will always yield a NAV that is not priced at \$1.00 indefinitely – the NAV of the fund will fluctuate in unison with the underlying securities of its portfolio.

Secondly, a floating NAV will reduce the possibility of material dilution by investors who are redeeming shares ahead of other investors when the shadow price deviates significantly below the constant NAV. Investors redeeming shares in times of market stress, can quite possibly dilute the shares of non-redeeming shareholders since the MMF will have to sell assets in order to meet the redemptions. If liquid assets have already been sold off the MMFs books in order to meet these redemption requests the remaining illiquid assets cannot be sold off and will contribute to further downward pressure on the remaining shares, thereby, diluting the shares. Supposedly, the SEC claims, investors who cannot withstand deviations in a floating NAV fund will shift to other investment products which provide a constant NAV similar to MMFs.

The imposition of a floating NAV for prime institutional MMFs incorporates an important caveat. Amortized cost valuation can still be used with funds employing a floating NAV. Amortized cost valuation can still be used for securities with a remaining maturity of up to 60 days, but only if the fund determines the use of such accounting is in good faith and reflects the fair value of the underlying security. However, an MMF cannot use amortized cost valuation “to value certain debt securities when circumstances dictate that the amortized cost value of the security is not fair value” (SEC 2014, 279). To be clear about the use of amortized cost valuation employing a floating NAV, the SEC notes: “A Fund may only use the amortized cost method to value a portfolio security with a remaining maturity of 60 days or less when it can reasonably conclude, at *each time* it makes a valuation determination, that the amortized cost value of the portfolio security is *approximately the same* as the fair value of the security as determined without the use of amortized cost valuation. Existing credit, liquidity, or interest rate conditions in the relevant markets and issuer specific circumstances at each such time should be taken into account in making such an evaluation” (SEC 2014, 280). Therefore, the use of amortized cost valuation can still be undertaken while the market is functioning “normally,” but cannot be used to determine the price of a debt security when there is tension within the financial system.

Even though the SEC provides guidance for MMFs employing a floating NAV to use amortized cost valuation, another caveat is introduced within said guidance! The SEC notes MMF portfolios are not solely comprised of liquid securities but of illiquid securities, which are rarely traded in the secondary market and thereby lacking easily obtainable quotations. The caveat within the caveat derives from the SEC’s wording in the description of the reforms, in that “funds holding debt securities *generally* should not fair value these securities at par or amortized cost based on the expectation that the funds will hold these securities until maturity, if the funds could not reasonably expect to receive approximately that value upon the current sale of those securities under current market conditions” (SEC 2014, 284-285). As is evident, MMFs *generally* should not employ amortized cost valuation on illiquid securities, unless, apparently, it is the only method to value the security.

Similar to the ulterior objectives for mandating prime institutional MMFs to transact at a floating NAV another motive is to enhance the possibility of investors experiencing volatility within MMF shares. Volatility within MMF shares comes from fluctuations in the values of the underlying securities. In order to highlight this risk to investors the SEC states prime

institutional funds transact at a floating NAV. Since investors, supposedly, have not fully realized this volatility exists within MMFs “... floating NAV reform ... will more fully reveal the risk from changes in the fund’s principal value to shareholders” (SEC 2014, 156). However, the implementation of a floating NAV also changes the way in which shares are priced. Prime institutional MMFs implementing a floating NAV will now move “from penny rounding (i.e., to the nearest one percent) to basis point rounding (i.e., to the nearest 1/100th of one percent), which is a more precise standard than other mutual funds use today” (SEC 2014, 158). Basis rounding, according to the SEC, better highlights the movements of the underlying securities within MMF portfolios. The SEC also claims basis point rounding will allow investors who remain in prime institutional funds with a floating NAV to be able to sufficiently bear the risks associated with the funds while simultaneously allowing investors to exit if they cannot.

In conjunction with a floating NAV, prime institutional funds as well as prime retail funds are subject to the liquidity fees and redemption gates. The purpose of liquidity fees is to maintain the “principal stability, liquidity, and ... yield” of MMFs by minimizing the downside risks redeeming investors pose to the viability of the fund, the remaining shareholders, as well as ameliorating further disruptions within the financial system (SEC 2014, 46). The SEC reasons that since a liquidity fee will be imposed, the fee may curtail investors from redeeming shares since there will be an explicit cost associated with redemption. Underlying the logic behind the SEC implementing liquidity fees is “... research in behavioral economics [which] suggests that liquidity fees may be particularly effective in dampening a run because, when faced with two negative options, investors tend to prefer the option that involves only possible losses rather than the option that involves certain losses, even when the amount of possible losses is significantly higher than the certain loss” (SEC 2014, 53). In comparison to behavioral economics, an alternative theory will be presented in Chapter 3 as to how investors might respond to the possibility or the implementation of liquidity fees.

Redemption gates are strictly for the purpose of stopping a run before it begins in times of market stress. A fund can do this by halting redemptions with the implementation of a gate. Redemption gates allow a fund experiencing liquidity difficulties to halt redemptions in order to stabilize the fund’s liquidity without having to sell assets at fire-sale prices to meet redemption requests. The financial crisis of 2007-2009 resulted in cataclysmic instability within the MMF industry; therefore, the SEC believes gates would be an effective tool to stymie runs on funds, thereby eliminating the possibility of a repeat of the runs on MMFs witnessed in the 2007-2009

financial crisis. According to the SEC, gates and fees will only enhance the MMF industry by reducing the risk of pre-emptive redemptions in times of market stress since investors will not be able to fully determine when and if a liquidity fee or gate will be implemented by any particular fund.

A liquidity fee of, but not exceeding 2%, can be employed by an MMF on redeeming investors if the funds weekly liquid assets “fall below 30% of its total assets [...]” (SEC 2014, 304). Additionally, an MMF will be required to impose a liquidity of, but not exceeding, 1% if its “weekly liquid assets fall below 10% of its total assets [...]” (SEC 2014, 304). An MMF will be allowed to halt redemptions with the implementation of gates “for up to 10 business days in a 90-day period, if the fund’s weekly liquid assets fall below 30% of its total assets [...]” (SEC 2014, 40). The SEC is also amending Rule 22e-3 to allow a fund to indefinitely suspend redemptions “if the fund’s level of weekly liquid assets falls below 10% of its total assets” (SEC 2014, 78). Finally, an MMF that has imposed a fee or gate must remove the fee or gate once the funds weekly liquid assets rise back above 30%.

Concern was raised in comment letters regarding MMFs implementing liquidity fees and redemption gates. Charles Schwab, Goldman Sachs, and J.P. Morgan all agreed that if an MMF were to implement either a liquidity fee or redemption gate this would cause reputational damage to the fund. This could occur if the fund were to control redemptions it could destabilize the fund by investing in risky assets and implementing a fee or gate in order to mitigate the losses occurring, leading investors to lose confidence in the fund. The SEC claims, however, that even if a repeat of the run on MMFs witnessed in the 2007-2009 financial crisis it would not be in the best interest of the financial system. The Boston Federal Reserve also claimed investors would be without liquidity when they needed it most if a fund were to implement a fee or gate. The SEC replied to the Boston Federal Reserve comment letter by noting that funds would only be inaccessible for a specific length of time or on demand for a fee, depending upon which strategy an MMF undertook. Finally, the SEC suggested that investors might shift out of MMFs which are capable of implementing fees and gates since these funds will no longer be attractive to certain investors.

Disclosure amendments were made throughout the 2014 reforms referencing numerous amendments or additions to existing rules. The SEC now requires an MMF to state in its prospectus that it has the ability to impose a liquidity fee or redemption gate to potential investors and the triggers for these fees and gates to be implemented, such as the 30% weekly

threshold, for example. If an MMF has implemented a fee or gate it must state when and why within its prospectus. An MMF must disclose whether sponsor or affiliate support was ever given to the fund and that the sponsor or affiliate has no obligation to provide assistance in the future. An MMF has to disclose whether it is a floating or constant NAV fund and if a constant NAV will become a floating NAV fund once the reforms are ratified in 2016. MMFs now must disclose their daily and weekly liquid assets on their websites for up to six months previous, which must be easily accessible to shareholders as well as to potential investors. Net shareholder flows for the past six months must also be easily accessible on MMF websites. MMFs must also disclose the shadow NAV and current NAV on their websites for the past six months. Finally, each of these amendments must also be filed within Form N-MFP introduced by the SEC within the 2010 reforms.

Along with the 2010 reforms disclosure requirements there was a substantive enhancement of MMFs having to file what is known as Form N-CR, which would be triggered “if a portfolio security defaults, an affiliate provides financial support to the fund, the fund experiences a significant decline in its shadow price, or when liquidity fees or redemption gates are imposed and when they are lifted” (SEC 2014, 374). Form N-CR is intended to provide enhanced transparency to investors and allow the SEC to determine underlying risks within the industry.

The requirement to file Form N-CR is not based solely upon a security within an MMF portfolio defaulting, but also “if the issuer or guarantor of a security that makes up more than one half of one percent of a fund’s total assets defaults or becomes insolvent” (SEC 2014, 377). Additionally, but not related to a security default, a fund must report whether a sponsor or an affiliate has provided support to the fund. In doing so, the fund must file “the nature, amount, and terms of support ... [and] certain identifying information about securities that are subject of any financial support”³⁷ (SEC 2014, 379-380). The SEC also mandates MMFs to clarify the amount of support given by a sponsor or an affiliate as the purchase price of the security from the MMFs portfolio, whether below or at par, as well as the amortized cost valuation of it.

³⁷ Financial support as defined by the SEC related to: “any capital contribution, purchase of a security from the fund in reliance on rule 17a-9, purchase of any defaulted or devalued security at par, execution of letter of credit or letter of indemnity, capital support agreement, ..., performance guarantee, or any other similar action reasonably intended to increase the value or liquidity of the fund’s portfolio; excluding, however, any routine waiver of fees or reimbursement of fund expenses, routine inter-fund lending, routine inter-fund purchases of fund shares, or any action that would qualify as financial support as defined above, that the board of directors has otherwise determined not to be reasonably intended to increase or stabilize the value or liquidity of the fund’s portfolio” (SEC 2014, 805-806).

MMFs still employing a constant NAV after the ratification of the 2014 reforms were required to file Form N-CR in 2016 if the shadow price of the fund moves “by more than ¼ of 1 percent (i.e., generally below \$0.9975)” (SEC 2014, 393). Not only do these funds have to report a decline in the shadow price, but they were also required to report the reason for such a decline. Extending the reason behind the decline in the shadow price, the MMF must report the issuer as well as the security that caused the decline in the shadow price of the fund. Finally, if an MMF imposes a liquidity fee or redemption gate it also must file Form N-CR. The filing must include why the fund chose to impose a liquidity fee or redemption gate, when the fee and gate were imposed, as well as when they were removed, the liquidity of the fund, “and the size of the fee” (SEC 2014, 399). If an MMF must file Form N-CR for any of the reasons listed above, it must file the form precisely one business day after the event which caused the filing.

Diversification requirements were also a target of the 2014 reforms. The SEC provided distinct clarification to these amendments since the effects on the MMF industry would be quite significant. Under the 2010 reforms, an MMF must confine 5% of its total assets to any single issuer in a first-tier security. Within the 2014 reforms, this diversification requirement was altered slightly and an MMF must treat separate entities, which are affiliated³⁸ with one another, as a single issuer under “Rule 2a-7’s 5% issuer diversification limits” (SEC 2014, 487). Additionally, MMFs must treat equity owners of ABCP conduits as well as affiliates of the conduit as one entity in order to comply with the 5% diversification requirement.³⁹ Obviously, both of these amendments to the diversification limits within MMF portfolios are attempts at reducing concentration risks within MMF portfolios.

The SEC has also proposed new diversification limits within the 2014 reforms. One of the proposed amendments states “non-ABS that are subject to a guarantee by a non-controlled person would be subject to rule 2a-7’s 10% diversification limit applicable to guarantees and demand features would continue to have no issuer diversification limit” (SEC 2014, 495). Additionally, MMFs holding ABS would be required to meet the 5% diversification limit for the

³⁸ Affiliated is defined by the SEC as “entities are affiliated with one another if one controls the other entity or is controlled by it or is under common control with it ... [and, control refers to] ownership of more than 50% of an entity’s voting securities” (SEC 2014, 489).

³⁹ However, there is another caveat within the 2014 reforms with respect to equity owners as well as independent equity owners, such that MMFs “will be subject to the 5% issuer diversification limit on the ABCP conduit and any ten percent obligors, but need not aggregate an ABCP conduit and its independent equity owners for the purposes of the 5% issuer diversification limit provided that a primary line of business of those independent equity owners’ activities with respect to the SPEs are limited to providing management or administrative services, and no qualifying assets of the ABCP conduit were originated by the equity owners” (SEC 2014, 493).

issuing SPE and obligor of the security as well as meeting the “10% [diversification] limit on the sponsor as the presumed guarantor” (SEC 2014, 496). Finally, the SEC is proposing to remove the reference to four NRSROs by MMFs, which it enacted in the 2010 reforms, with respect to the 5% diversification rule.⁴⁰

With the last of the diversification requirements in the 2014 reforms, the SEC is requiring MMFs to “treat the sponsors of ABS as guarantors subject to rule 2a-7’s 10% diversification limit applicable to guarantees and demand features, unless ... the fund is not relying on the sponsor’s financial strength or its ability or willingness to provide liquidity, credit or other support to determine the ABS’s quality or liquidity” (SEC 2014, 506). The reason for this change is the overexposure MMFs encountered on ABCP sponsors throughout the financial crisis of 2007 to 2009. The SEC understands MMFs investing in ABS will not rely upon only the sponsor of the ABS to provide support in a distressed market, however, for the SEC to be sure of this it is requiring diversification among sponsors in order to ensure the MMF industry is properly diversified. Furthermore, the SEC is also requiring MMFs to treat sponsors as guarantors, if they are not relying on the sponsor’s support, for ABS in order to achieve the SEC’s requirements for diversification.

Stress testing enhancements were also required for MMFs in the 2014 reforms. The SEC concluded the requirements set forth in the 2010 reforms pertaining to stress testing were insufficient, hence additional testing was needed. MMFs must now test whether they can maintain weekly liquid assets of 10%, since if a fund’s weekly liquidity declines below 10%, the fund must impose a liquidity fee of up to 1%. The SEC suggests MMFs test their liquidity thresholds of up to 30%; however, this type of stress test will be done on a discretionary basis. In addition to stress testing liquidity levels, MMFs are required to test whether they can minimize principal volatility within their portfolios, despite employing a floating or constant NAV – maintaining a “constant” NAV should still be of utmost concern for all MMFs.

Additionally, MMFs should also be stress testing for portfolio-disrupting events, such as, but not limited to, “an increase in the general level of short-term interest rates, a downgrade or default of a portfolio security position, a correlated increase in the credit spreads for certain portfolio securities, and an increase in redemptions” (SEC 2014 568-569). In reference to

⁴⁰ In October of 2015, the SEC was able to remove the reference to four NRSROs within its amendments to 17 CFR Parts 270 and 274 Release No. IC-31828; File No. S7-07-11, RIN 3235-AL02, “*Removal of Certain References to Credit Ratings and Amendment to the Issuer Diversification Requirement in the Money Market Fund Rule.*”

MMFs stress testing certain securities, the SEC urges tests to be conducted on differing sets of assumptions pertaining to a certain loss, downgrade or default of a security and the effects of these actions on the remainder of the MMFs portfolio.

An MMF should also be testing its portfolio as to whether it can properly handle a deviation in credit spreads as well as testing for correlations between asset prices within certain sectors, such as nonfinancial commercial paper, and how the possible correlation of prices between nonfinancial commercial paper would affect its portfolio. With respect to shareholder redemptions, MMFs must test whether they can withstand a differing amount of redemptions, and must also test these redemption requests in conjunction with “an increase in interest rates, a downgrade or default of various portfolio securities, and a yield spread change in various sectors of portfolio securities” (SEC 2014, 578). The SEC urges MMFs to consider other alternative events and stress test their portfolios against these alternatives in order to be better informed of the underlying risks within their portfolios. And finally, MMFs must report these stress tests to their board of directors.

Now that the 2010 and 2014 reforms have been described, we will now see how each sets of reforms altered the MMF industry. Before doing so however, we will provide several theories pertaining to each of the reforms included in each sets of reforms ratified by the SEC. Chapter 3 will undertake the foundational aspects of the theory, which will then be used in analyzing the reforms.

CHAPTER 3: THEORY & EMPIRICS OF 2010 & 2014 REFORMS

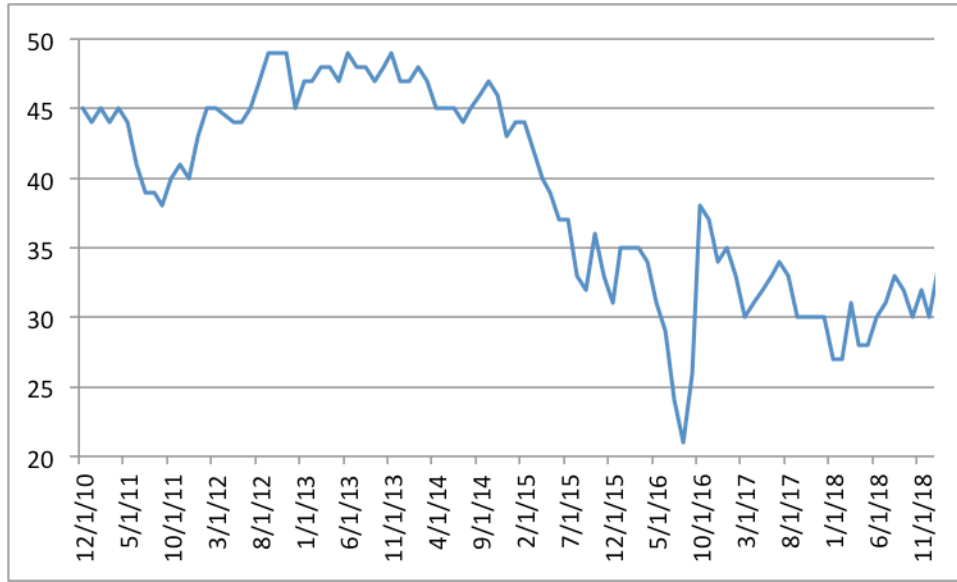
In order to analyze the effects of the 2010 and 2014 reforms on the MMF industry we provide a theoretical framework to analyze each set of reforms and how they altered the MMF industry. Since the reforms targeted numerous aspects of the MMF industry we will undertake a certain level of abstraction in our analysis due to the data available. As we have seen, each of the reforms implemented in 2010 and 2014 incorporated considerable changes to the MMF industry as a whole. Within this Chapter we provide a theory for maturity risk, liquidity risk, diversification risk, concentration risk, and finally, liquidity preference theory proposed by John Maynard Keynes and elaborated upon by Lavoie (2014) in conjunction with behavioral economics as well as evolutionary biology. After each theory is given, we highlight which segment of reforms the theory is focused on and provide an empirical analysis of how the

reforms altered the MMF industry. The period of analysis is from December of 2010 until December of 2018 since we want to understand the impacts of the reforms on the MMF industry.

Maturity risk was addressed by the SEC within the 2010 reforms – relating to the reduction of the weighted average maturity (WAM) of MMF portfolios from a maximum of 90 to 60 days. Additionally, reducing the remaining days to maturity of second-tier securities up to 45 days was also supposed to ameliorate the downside effects of maturity risk. The maturity risk the SEC was trying to ameliorate within the 2010 reforms was a reduction of credit risk within MMFs portfolios. Credit risk is concerned with the firms issuing liabilities, but also the holders of these liabilities – MMFs in this case. More specifically, credit risk can also be further decomposed into the maturity mismatch MMFs encounter by issuing shares in order to purchase their assets due to the fictitious liquidity they create. Therefore, MMFs maturity mismatch encompasses two distinct, but intrinsically related risks – one of rollover risk and the other of fictitious liquidity pertaining to the holdings of commercial paper within MMF portfolios.

We begin with the first aspect relating to maturity risk in which the SEC attempted to strengthen MMF portfolios by shortening the WAM. The SEC’s reasoning behind reducing the WAM was to increase MMFs ability to withstand interest rate shocks, reduce the possibility of an adverse impact on credit spreads within MMF portfolios and allow funds to properly meet investor redemptions if such redemptions come to fruition. If we look at the WAM of prime institutional as well as prime retail MMFs we find the WAM they have employed was well under the 60-day limit, as can be seen in Figure 1. Examining Figure 1, we see the WAM of MMFs remaining roughly around 50 days until mid- to late-2013, and declining considerably until the end of 2018. The underlying fluctuations within the WAM of MMFs can be partially attributed to the holdings of commercial paper within their portfolios as will be seen later.

Figure 1: Weighted Average Maturity of Prime MMFs

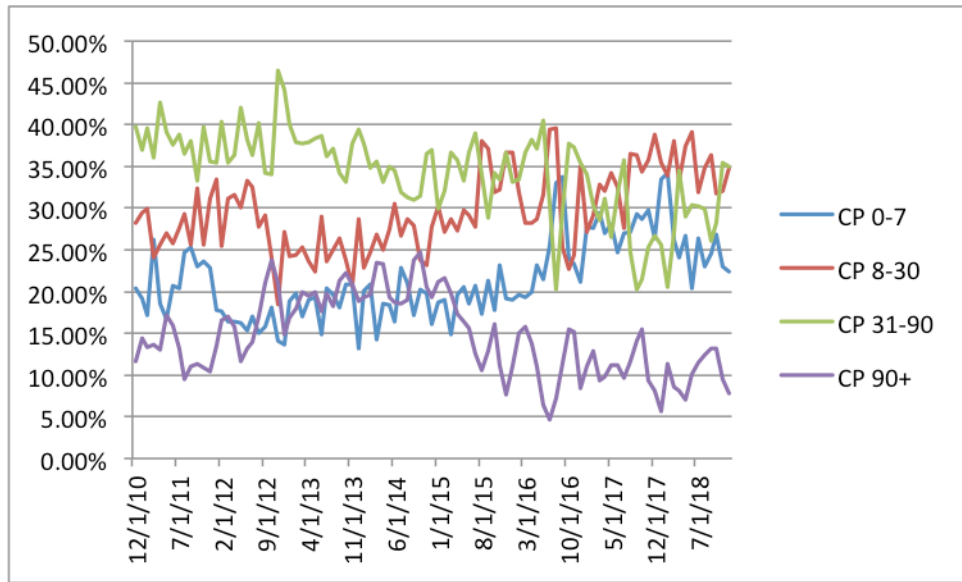


Source: Investment Company Institute.⁴¹

The most significant aspect the SEC has failed to recognize in reducing the WAM of MMF portfolios is the maturity of the assets, which comprise the portfolio. In order for an MMF to reduce the WAM of the portfolio it must invest in assets of shorter maturity to comply with the reforms. Taking commercial paper for example, MMFs must shift their holdings of paper into shorter duration to comply with the reduction of the WAM. Let us briefly examine how the maturity distribution of commercial paper has changed since the reforms, which is composed of ABCP, financial CP, and nonfinancial CP. The maturity distribution for all three types of commercial paper held within prime MMF portfolios is given below.

⁴¹ The Investment Company Institute aggregates Form N-MFP data filed by MMFs into easy-to-access monthly Excel spreadsheets on its website. We have constructed this chart along with the majority of the other charts within this paper from the monthly data provided by the Investment Company Institute. Any and all errors within the charts I have constructed are my own – not the Investment Company Institute’s. The Investment Company Institute granted me permission to use their monthly data until 12/2018 and I am seriously indebted to them for allowing me to do so.

Figure 2: Maturity Distribution of CP in Prime MMF Portfolios



Source: Investment Company Institute

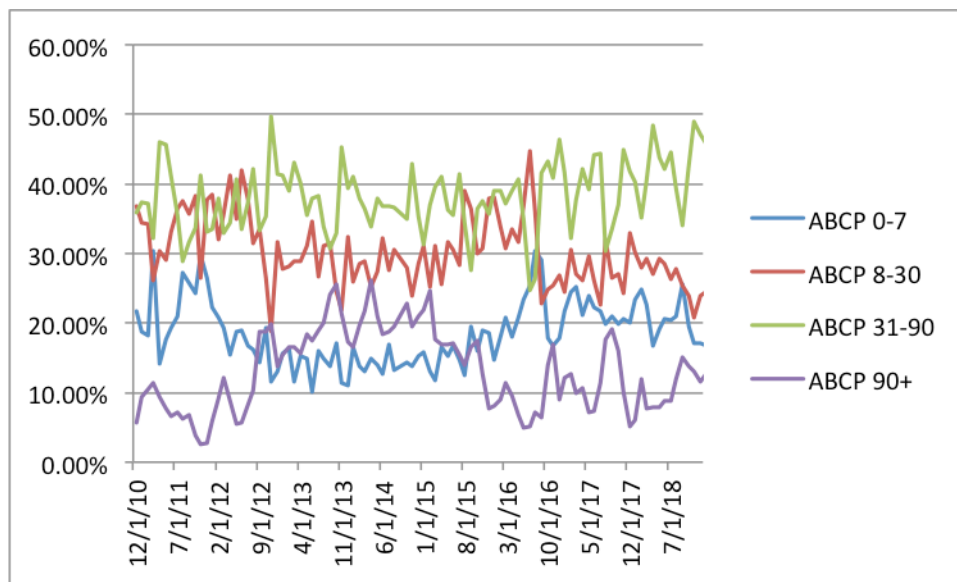
Each of the lines within Figure 2 represents the days remaining until maturity of commercial paper. The blue line represents commercial paper having a remaining days until maturity of 0-7 days, the red line shows commercial paper with remaining days until maturity of 8-30 days, the green line signifies the remaining days until maturity between 31-90 days and the purple line represents remaining days until maturity of 90+ days. The remaining days until maturity is calculated using commercial paper only. So, for example, if an MMF portfolio holds \$100 of commercial paper and holds \$25 of its paper maturing in 0-7 days, \$25 maturing in 8-30 days, \$25 maturing in 31-90, and \$25 maturing in 90+ days, the percentage of each length of maturity is evenly divided across the portfolio.

As can be seen from Figure 2, the amount of commercial paper maturing in 0-7 days remained relatively flat until 2016 and then increased slightly within MMF portfolios. Commercial paper maturing in 0-7 days shows considerable signs of movement and has increased from roughly 20% of the total paper in MMF portfolios to slightly above 20%. Maturing paper of 8-30 days has increased quite significantly, rising from slightly below 30% of the entirety of commercial paper to roughly 35% of maturing paper since the reforms were implemented. Additionally, commercial paper having a remaining maturity of 31-90 days has slightly decreased in the aggregate but has moved considerably throughout the time period of analysis – from slightly below 40% to roughly 35% of MMF portfolios. Finally, longer-term

commercial paper with 90+ days remaining until maturity did not contribute to a significant amount of paper within MMF portfolios in the aggregate. However, there is a noticeable upward trend from the beginning of 2010 until 2014, in which commercial paper with 90+ days remaining until maturity rose from roughly 10% to a little below 25% and fell after the 2014 reforms were published by the SEC to roughly 7% by the end of 2018.

We can see clearly a slightly upward trend in commercial paper maturing between 0 and 7 days relative to longer-term paper, which somewhat solidifies our hypothesis that MMFs have shifted their holdings of paper into shorter duration. Additionally, there is almost a mirror image of commercial paper with remaining days until maturity of 8-30 days and 31-90 days, which further provides evidence for our hypothesis of MMFs moving into paper of shorter duration. In order to gain a more complete understanding of the maturity distribution of commercial paper within MMF portfolios, we now examine ABCP, financial and nonfinancial CP, since these are the three types of paper, which comprise commercial paper. Figure 3 presents the maturity distribution of ABCP.

Figure 3: Maturity Distribution of ABCP in Prime MMF Portfolios

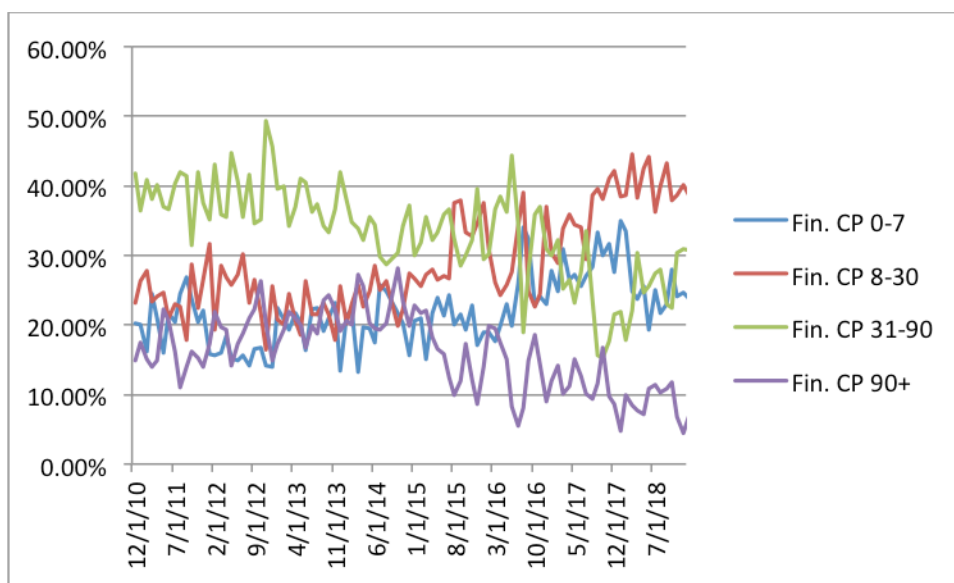


Source: Investment Company Institute

Beginning with ABCP with 0-7 remaining days until maturity, highlighted by the blue line in Figure 3, we see again large gyrations within prime MMF portfolios; however, in December 2010 this represented roughly 20% and by December of 2018 represented slightly

above 15% of prime MMF portfolios. ABCP with 8-30 remaining days until maturity was significantly large in prime MMF portfolios in December of 2010, roughly above 35% and had large swings within portfolios, but by December of 2018 comprises below 25% of the paper maturing in 8-30 days. Similar to ABCP maturing in 8-30 days, ABCP with 31-90 remaining days until maturity also comprises a significant percentage within prime MMF portfolios. At the beginning of our dataset, in December of 2010, ABCP with 31-90 remaining days until maturity represented roughly 35% within prime MMF portfolios and has actually increased to slightly above 45%. Finally, ABCP with 90+ remaining days until maturity has shown what seems to be the most volatile within prime MMF portfolios. Beginning in December of 2010, ABCP maturing in 90+ days represented slightly above 5%, increasing to roughly 26% in April of 2014, and then declining downward to slightly above 10% by December of 2018. In Figure 4, we present the maturity distribution of financial commercial paper within prime MMF portfolios.

Figure 4: Maturity Distribution of Financial CP in Prime MMF Portfolios

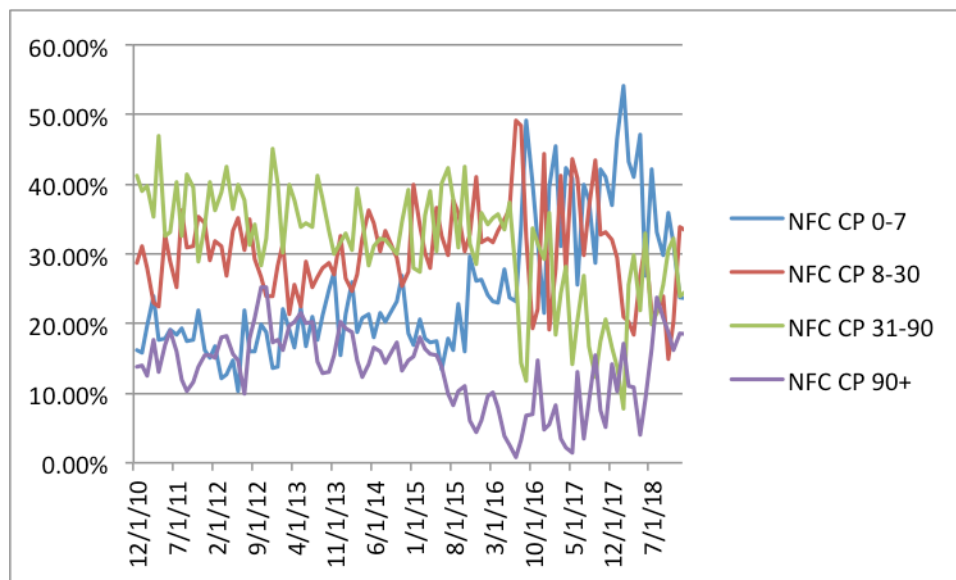


Source: Investment Company Institute

Financial commercial paper maturing between 0-7 days within Figure 4 has slightly increased throughout the evolution of the graph. In December 2010, financial commercial maturing in 0-7 days represented roughly 20% of prime MMF portfolios and by December of 2018 represented slightly below 25%. Financial commercial paper with 8-30 remaining days

until maturity significantly increased with prime MMF portfolios. In December of 2010 financial commercial paper maturing between 8-30 days represented roughly 25% and in December of 2018 had come to represent slightly below 40%. It is interesting to note that financial commercial paper with 8-30 days remaining until maturity increased significantly once the 2014 reforms were published. Financial commercial paper with 31-90 remaining days until maturity has shown a downward trend within prime MMF portfolios and has been quite volatile. In December of 2010 financial commercial paper maturing in 31-90 days stood at around 40% and in December of 2018 has moved downward to slightly above 30% of prime MMF portfolios. Financial commercial paper with 90+ days remaining until maturity also shows a downward trend within prime MMF portfolios. Beginning in December of 2010, financial paper with 90+ days remaining until maturity stood roughly around 15% and has decreased to slightly above 5%, also showing considerable volatility within prime MMF portfolios. Even though there is a downward trend of financial commercial paper with 90+ remaining days until maturing there was slightly an increase in this type of paper until the SEC published its second round of reforms in 2014. Lastly, Figure 5 presents the maturity distribution for nonfinancial commercial paper within prime MMF portfolios.

Figure 5: Maturity Distribution of Nonfinancial Commercial Paper in Prime MMFs



Source: Investment Company Institute

Figure 5 shows that nonfinancial commercial paper (“NFCP”) with 0-7 days remaining until maturity represents a relatively low portion, roughly 15%, of prime MMF portfolios in December of 2018. However, until mid- to late-2015 NFCP rises rapidly peaking slightly below 55% in the beginning of 2018 but has come down to slightly above 25% by December of 2018. The portion of NFCP with 8-30 remaining days until maturity has remained relatively flat within prime MMF portfolios, but with volatile upward and downward swings since 2010. In December of 2010, NFCP maturing between 8-30 days accounted for roughly 26%, while in December of 2018 this paper accounted for close to 35%, peaking in the middle of 2016, slightly above 45%. Additionally, NFCP with 31-90 remaining days until maturity has declined somewhat in prime MMF portfolios, but with sharp movements. In December of 2010, NFCP represented roughly 37% and in December of 2018 represents roughly 27% of the NFCP in prime MMF portfolios. Lastly, NFCP with 90+ remaining days until maturity has remained relatively stagnant in prime MMF portfolios although there are minor fluctuations throughout the time period. Interestingly enough, NFCP with 90+ days remaining until maturity almost declined to 0% twice – the first being in the middle of 2016 and the second in the middle of 2017. Throughout the time period NFCP maturing in excess of 90+ days grew from roughly 13% in December of 2010 to roughly 18% within prime MMF portfolios.

Reviewing, our hypothesis that prime MMFs have switched into commercial paper of shorter duration is invalid with simply glancing at the maturity distribution of ABCP. In fact, the maturity distribution of ABCP has increased, rather than decreased, within prime MMF portfolios, which should be of concern. The hypothesis that prime MMFs have invested a greater portion of their portfolio of financial commercial paper with lower maturity does hold, although weakly toward the end of 2018. Financial commercial paper with both 0-7 and 8-30 remaining days until maturity, has increased dramatically while paper with remaining days until maturity of 31-90 and 90+ has stagnated. Short-term NFCP with 0-7 remaining days until maturity has also grown somewhat significantly, however this growth only occurs since the middle of 2015. Even though NFCP with 8-30 remaining days until maturity has fluctuated considerably, the growth of it has been near constant in the aggregate. And, both NFC commercial paper with 31-90 and 90+ days remaining until maturity has declined somewhat over the period of analysis.

Evidently, each of the different types of paper has shown considerable fluctuation; some paper providing evidence for our hypothesis and other paper providing evidence against our

hypothesis. However, in the overall trend of prime MMFs shifting into paper of shorter maturity, represented in Figure 2 for total commercial paper, we do witness a growth of shorter-term paper in prime MMF portfolios while paper of longer maturity has declined.⁴² Therefore, we can reasonably conclude prime MMFs have increased the risks within their portfolios by holding commercial paper of lower maturity. Additionally, if we refer to Figure 1, it is evident prime MMFs have shifted their portfolios into shorter maturity even though the shift of commercial paper has been relatively minor.

The shift of assets into shorter maturities poses significant problems for MMFs regardless of the SEC claiming otherwise. The maturity risk that arises from holding commercial paper becomes crucial to the safety and soundness of MMFs. Maturity risk is enveloped within credit risk since credit risk, by definition, is that of the borrower failing to repay his/her liability. Extending the concept of maturity risk further, we find maturity risk to be intrinsic to the ability of the borrower to repay its outstanding debt.

Financing of liabilities is crucial for firms since they are in the profit-making business – so, “a decision to invest – to acquire capital assets – is always a decision about a liability structure” (Minsky 2008 (1986), 192). The issuance of debt by firms is used for the purpose of investment; therefore, borrowing is a money-today-for-money-tomorrow scheme (Minsky, 2008). Throughout relatively “safe” and “normal” times within the economy the liability structure of firms will be determined on the basis of margins of safety (Minsky, 2008 (1986)). An underlying aspect of a monetary production economy is that overtime these stable relationships become unstable and lead to riskier and riskier issuances of debt. What was considered a stable source of financing becomes unstable, since the cash flows to meet past debt commitments begin to diminish and firms are faced with an increasing debt ratio where they evolve into speculative and Ponzi financing units, in which the former can only pay the interest on the outstanding debt, while the latter must sell assets in order to meet interest or principal payments (Minsky, 1992).

⁴² It would be interesting to undertake a study of the commercial paper within MMF portfolios in which an econometric model is constructed to understand if the maturity dispersion of commercial paper is of the same paper at different maturities. For example, if an MMF is holding commercial paper with 90+ days remaining until maturity, which shrinks to the category of 31-90, and further shrinks to the category of 8-30 and so on. However, this type of analysis is beyond the scope of this paper.

Commercial paper satisfies the role of short-term debt and is used for the day-to-day operations of the issuing firm.⁴³ The financing of working capital is usually done through the issuance of commercial paper, which is crucial to firms since “profits can only become fully available as cash income to entrepreneurs if their working capital is financed through borrowing” (Godley and Cripps 1983, 66). To further solidify this point, Minsky (2008, 1986) also states the use of short-term credit is used to finance production, which we can argue can take the form of commercial paper since it is used to finance working capital. The inherent problem of short-term debt, such as commercial paper, is that the liability structure was determined during an upswing in the economy. Firms, throughout the normal functioning of the market however, would have increased their debt levels since it was acceptable to do so during this time period. Obviously, a firm’s liability decisions were based on an expected profit rate which, during a downturn begins to erode rapidly (Minsky, 2016).

During a downturn expected profits begin to diminish; realized profits also diminish leading to an inability of firms to service past liability commitments. If, for instance, these firms have outstanding commercial paper maturing in 0-7 days, 8-30, or even 90+ days, this will be the first of a series of liabilities a firm will not be able to meet. This is due to the fact that firms are no longer experiencing expected profits as realized profits, profit margins are declining, and past debt commitments are beginning to build. If firms in the aggregate are all experiencing this difficulty as is usually the case in a recession, the only alternative is an extinguishing of debt, whether by default or rollover, and this is liquidity risk MMFs must encounter with their holdings of commercial paper.

The SEC, in the 2010 reforms, has tried to ameliorate MMFs liquidity risk⁴⁴ by requiring funds to hold a certain amount of daily and weekly liquid assets,⁴⁵ and funds can no longer hold

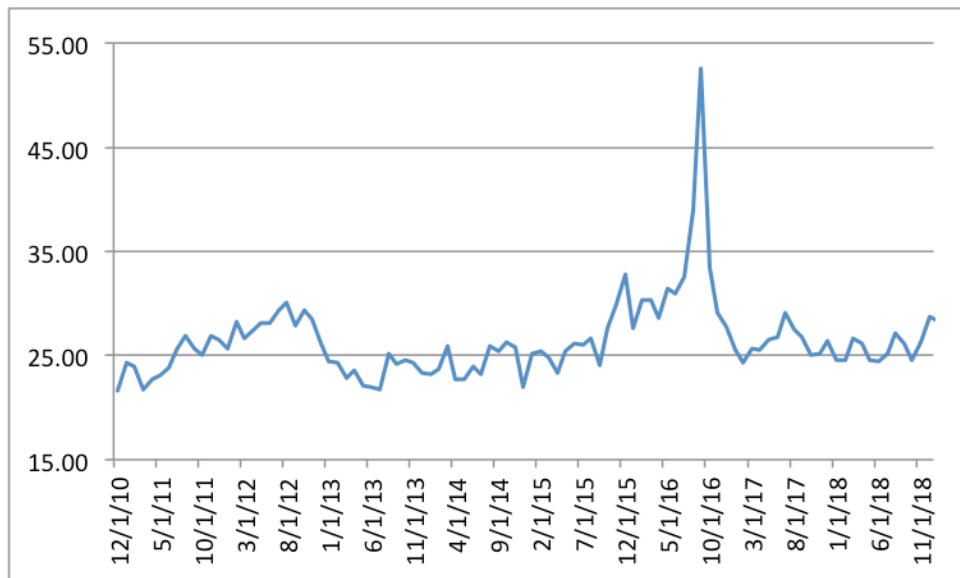
⁴³ However, we must take care to recall MMFs hold three distinct types of commercial paper: financial CP issued by financial institutions, nonfinancial CP issued by nonfinancial firms, and ABCP issued by conduits in order to securitize assets. Therefore, the majority of commercial paper held in MMF portfolios is not used to finance the working capital of, say, Staples – it used to finance the purchasing and selling of assets. However, this type of analysis is beyond the scope of this paper.

⁴⁴ As an aside, but worth mentioning, the SEC has failed to account for what the true meaning of liquidity is – and, that is whether the securities within MMF portfolios can be easily lent, rather than if the securities can be easily sold into the secondary market. If we define liquidity in this way – it is quite clear commercial paper does not satisfy this definition of liquidity.

⁴⁵ The SEC defines daily liquid assets as: “cash, direct obligations of the U.S. Government, or securities that will mature or are subject to a demand feature that is exercisable” (SEC 2010, 177). Weekly liquid assets defined by the SEC represent: “cash, direct obligations of the U.S. government, Government securities that are issued by a person controlled or supervised by and acting as an instrumentality of the Government of the United States pursuant to authority granted by the Congress of the United States that: are issued at a discount to the principal amount to be

more than 5% of their total portfolio in illiquid securities. Liquidity thresholds, as mandated by the SEC, are for the sole reason of MMFs being able to meet redemption requests by investors and to provide funds with the ability of staying liquid through times of market stress. Figures 6 & 7⁴⁶ present each chart showing the daily liquid assets as well as weekly liquid assets with prime MMF portfolios from December of 2010 until December of 2018. As can be seen from both charts, prime MMFs are definitively above the requirements the SEC has mandated.

Figure 6: Daily Liquid Assets as a Percent of Prime MMF Portfolios

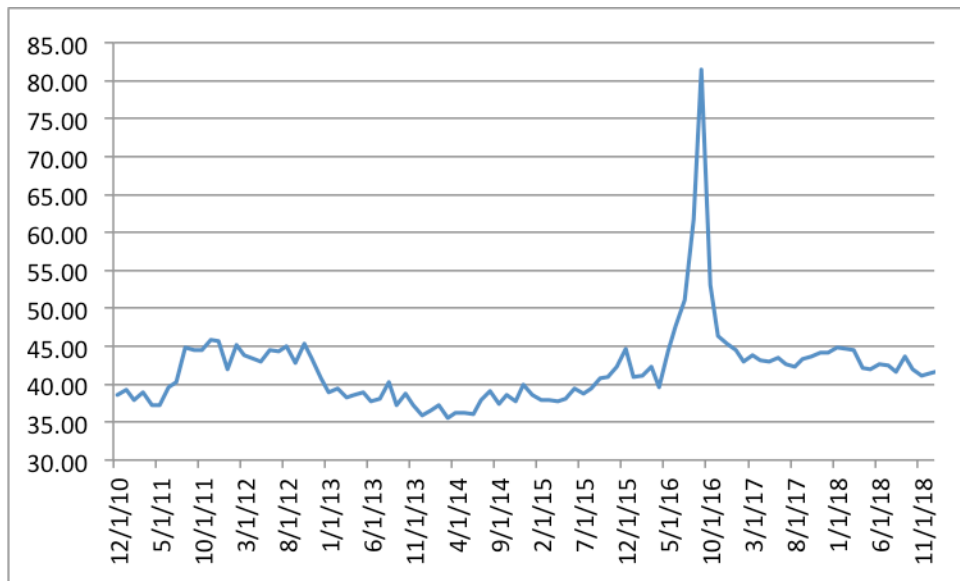


Source: Investment Company Institute

repaid at maturity; and have a remaining maturity date of 60 days or less; or securities that will mature or are subject to a demand feature that is exercisable and payable within five business days” (SEC 2010, 183).

⁴⁶ Until 4/30/16 prime MMFs reported daily and weekly liquid assets in monthly form, after this date the SEC required prime MMFs to submit their weekly daily and weekly weekly liquid assets. We average the weekly daily and weekly weekly into monthly daily and monthly weekly in order to present the time series of daily and weekly liquid assets more concisely.

Figure 7: Weekly Liquid Assets as a Percent of Prime MMF Portfolios



Source: Investment Company Institute

Both Figures 6 & 7 present relatively stable holdings of daily and weekly liquid assets, which comprise MMF portfolios. Daily and liquid assets are represented as a percentage with reference to the entire portfolio. It is interesting to note, when President Trump was elected in November of 2016, prime MMFs shifted the majority of their portfolios assets into cash, Treasuries, or securities issued by the United States government, which shows the uncertainty within financial markets throughout the first months following the election.

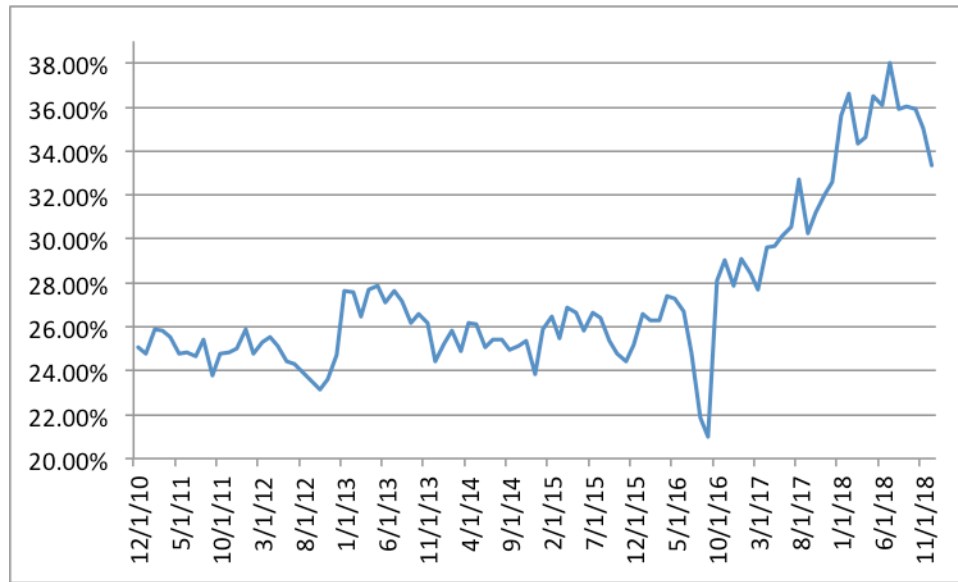
Again, the SEC has failed to consider the fact that liquidity risk does not come solely from investor redemptions in times of market stress. While prime MMFs must bear the risk of investor redemptions they also incur a form of non-hedgable liquidity risk pertaining to rollover risk when investing in commercial paper and that of fictitious liquidity which they create. Rollover risk is the risk of the issuer of the commercial paper not being able to rollover its paper and replacing the maturing paper with new paper. On the other hand, the buyers of the commercial paper (MMFs in this case) do not have to accept the rolling over of commercial paper and can demand full repayment. If an MMF does not accept the rolling over of commercial paper and demands payment and if the firm rolling over the paper cannot meet this request, the issuer of the paper defaults. The result of this is that MMFs will have to re-price their NAVs below current price, since the underlying securities encompass NAVs. If the markdown of an MMF NAV is large enough, the MMF faces the threat of breaking the buck.

Simultaneously, fictitious liquidity becomes readily apparent “since it [MMF] depends on the ability of commercial firms to meet their payments on commercial paper, yet the fund shares are priced as if they were more liquid than insured bank deposits;”⁴⁷ therefore, a failure of an issuer to rollover its outstanding commercial paper in MMF portfolios highlights the fact an MMF now cannot price its share to \$1 or thereabout if it is a floating NAV, but must markdown its NAV – thereby creating the possibility of breaking the buck.

The result of rollover risk and fictitious liquidity clearly shows the amount of daily and weekly liquid assets prime MMFs hold in their portfolios is of little significance. If, for example, there were another commercial paper market freeze similar to that witnessed in the 2007-2009 financial crisis, MMFs would again be at the center of this crisis. The result of prime MMFs being at the heart of the next financial crisis cannot be the case because the SEC states prime MMFs must be diversified in their holdings of second-tier securities (a rating other than the highest possible) and cannot invest more than one half of one percent of their total portfolio in a single issuer. However, the diversification requirements put forth by the SEC within the 2010 did absolutely nothing to target commercial paper within prime MMF portfolios. When Lehman Brothers filed for bankruptcy its commercial paper was rated triple-A. Since data of second-tier securities is unobtainable we turn to the holdings of commercial paper within prime MMF portfolios to understand the results of the diversification requirements of second-tier securities within funds. This can logically be done since the majority of commercial paper throughout the 2007-2009 financial crisis was marked down from the rating it was originally given to a rating that would be comparable with a second-tier security rating. Additionally, in 2015 the SEC removed prime MMFs from having to designate four NRSROs that it would reference to determine the rating of the security. The 2015 reforms also removed the separation between first-tier and second-tier securities therefore, nullifying the diversification requirements within the 2010 reforms. Figure 8 presents the percentage of commercial paper held within prime MMF portfolios since December of 2010.

⁴⁷ (Kregel, 2012, 65)

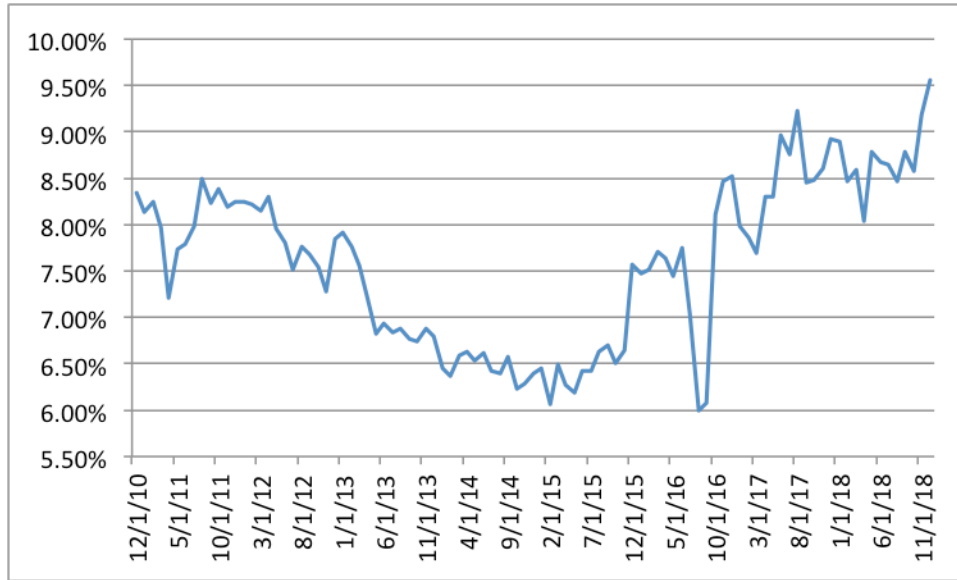
Figure 8: Percentage of Commercial Paper Held in Prime MMFs



Source: Investment Company Institute

As can be seen from Figure 8, prime MMFs have kept the portion of their holdings of commercial paper within their portfolios relatively constant from 2010 until the beginning of the second quarter of 2016. Prime MMFs reduced their holdings of commercial paper and since the second quarter of 2016 have been significantly increasing their holdings of commercial paper. Even with the 2010 and 2014 reforms there were no major changes within prime MMFs holdings of commercial paper which represented between 25% and 27% of their entire portfolios, peaking at 38% in July of 2018 and declining in December of 2018 to roughly 33% of prime MMFs portfolios. It is evident, however, the 2015 reforms, which are not under review within this essay, did have a significant impact on the prime MMF industry and should possibly be further considered for this spectacular rise. In order to understand how prime MMFs are still contributing to the shadow-banking sector, the evolutionary holdings of ABCP within prime MMF portfolios are shown in Figure 9.

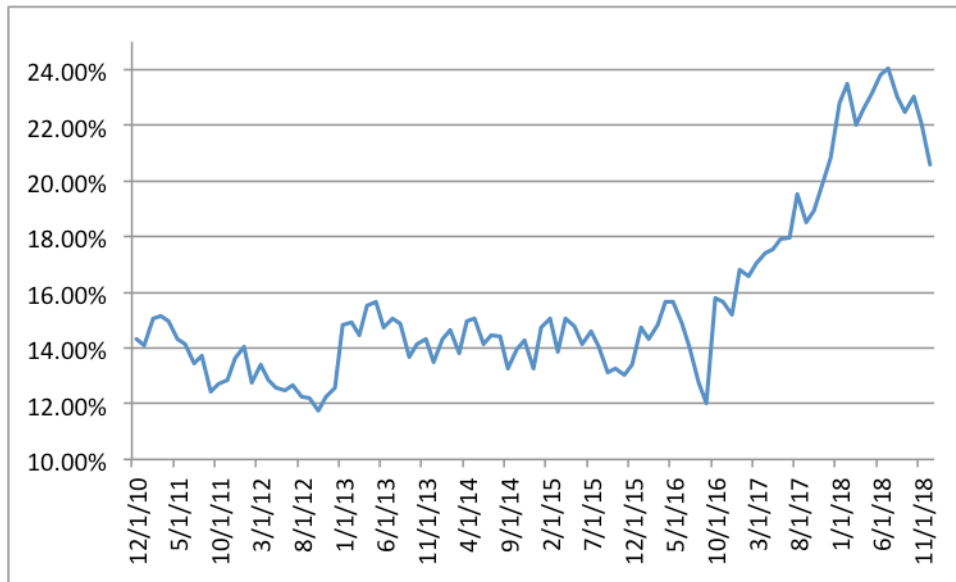
Figure 9: Percentage of ABCP Held in Prime MMFs



Source: Investment Company Institute

Prime MMFs surprisingly do not hold a significant amount of ABCP within their portfolios. In December of 2010, prime MMFs held roughly 8.25% of their entire portfolio within ABCP. Once the reforms were put into place holdings of ABCP within prime MMF portfolios decreased to a low of roughly 6% of total portfolio holdings. In April of 2016 the holdings of ABCP within prime MMFs began to rise rapidly and these funds, by December of 2018, hold roughly 9.5% of their entire portfolio in ABCP. However, even though prime MMFs do not hold the majority of their portfolio in ABCP, we can reasonably conclude even with the volatility of prime MMFs holdings of ABCP that prime MMFs are still a significant contributor to conduits securitizing assets. In Figure 10 below, we present the holdings of financial commercial paper held in prime MMF portfolios.

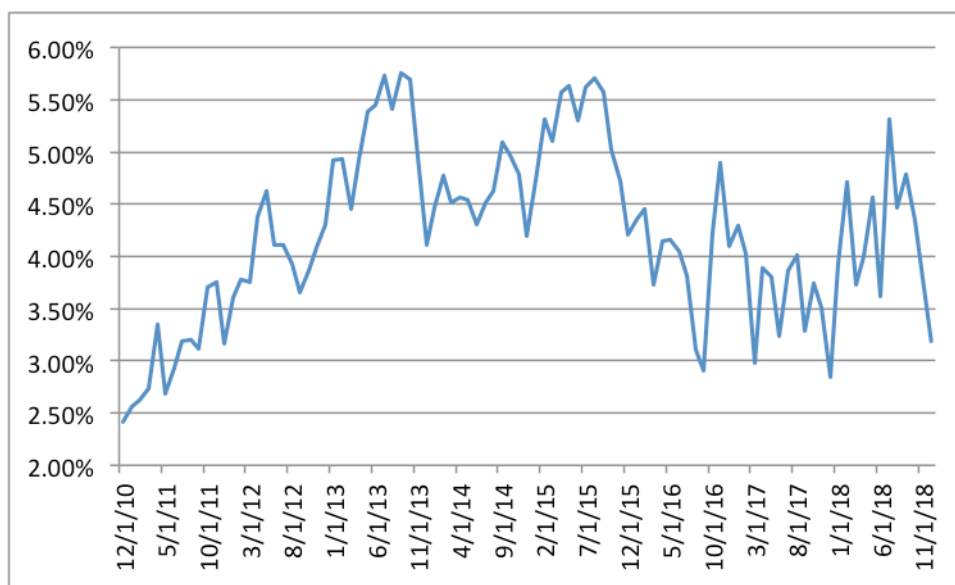
Figure 10: Percentage of Financial Commercial Paper Held in Prime MMFs



Source: Investment Company Institute

Financial commercial paper held by prime MMFs has also remained relatively stable within fund's portfolios since both sets of reforms were implemented, hovering between 14% and 16%. Similarly to ABCP, there was a precipitous fall in holdings of financial paper from April 2016 until September of 2016 followed by a spectacular rise in October of 2016 until December of 2018 when it represents roughly 22% of prime MMF portfolios. As financial commercial paper is issued by finance companies we can accurately claim prime MMFs purchasing commercial paper issued by financial companies is contributing to the quiet rise, once again, of the shadow-banking sector. In Figure 11, we present nonfinancial commercial paper held within prime MMF portfolios.

Figure 11: Percentage of Nonfinancial Commercial Paper Held in Prime MMFs



Source: Investment Company Institute

Nonfinancial (“NFC”) commercial paper has shown considerable volatility within prime MMF portfolios since the 2010 and 2014 reforms implemented by the SEC. In December of 2010, NFC commercial paper accounted for less than 2.5% of the commercial paper within prime MMF portfolios but rose to a high of almost 6% by September of 2013. In September of 2013 it trended downward but rose back to its peak of roughly just under 6% in August of 2015. It has fallen since, and in December of 2018 represented only roughly above 3% of prime MMF portfolios. Unlike ABCP and financial commercial paper there have been wide swings within the holdings of NFC commercial paper, but it has not represented a major portion of prime MMF portfolios since the SEC reforms of either 2010 or 2014.

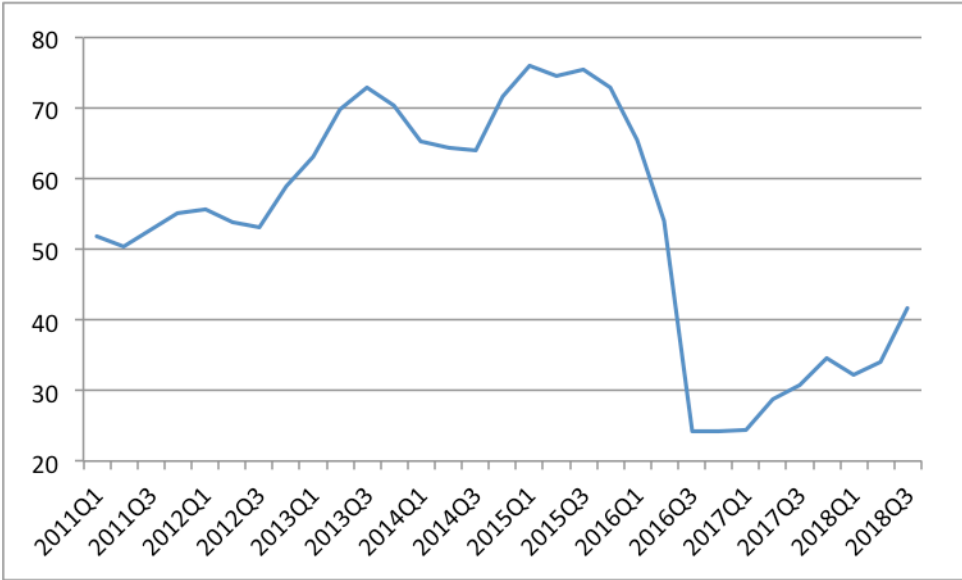
As can be seen from Figures 8 through 11, total commercial paper comprising ABCP, financial, and nonfinancial has contributed to a decent portion of prime MMF portfolios since the 2010 and 2014 reforms. Each set of reforms was supposed to enhance the safety and soundness of prime funds for investors. However, once the 2014 reforms were ratified in the beginning of 2016, prime MMFs drastically increased their holdings of commercial paper where at least 33% of the portfolio is commercial paper of short duration. The counterargument to what has been presented is that the remainder of prime MMF portfolios includes U.S. Treasuries, securities issued by the government, or repurchase agreements with U.S. Treasuries or government issued securities as collateral. Concentration risk becomes readily apparent if we

examine outstanding open market paper the Federal Reserve provides through its Flow of Funds accounts, which sums together nonfinancial commercial paper and financial commercial among various other short-term liabilities. Flow of Funds data also provides open market paper held in the portfolios of MMFs, but this is for all MMFs. However, only prime MMFs can invest the majority of their portfolio in commercial paper, whereas government MMFs are regulated to holding 0.5% of their portfolio in commercial paper. If we examine the ratio of open market paper held within MMF portfolios in comparison to open market paper outstanding this allows us to understand the amount of open market outstanding which is held in MMF portfolios. Finally, bankers' acceptances' issued by private depository institutions began to slowly decline in Quarter 3 of 1991 and were 0 by Quarter 3 of 2013.⁴⁸ Figure 12 provides a graph of open market paper held in MMF portfolios divided by outstanding open market paper from Quarter 1 of 2011 until Quarter 4 of 2018.

Concentration risk analyzes the impact on risks of excessive concentration of a particular asset class within a portfolio (Figini and Uberti, 2013). A simple example of concentration risk is an investment of seventy percent of the entire portfolio with one security. Concentration risk within MMF portfolios is among the entire prime MMF industry – no amount of diversification the SEC implements within reforms will exterminate the concentration risk witnessed within this industry as can be seen from Figure 12. When the SEC implemented the 2010 reforms, MMFs held roughly 50% of the outstanding open market within the financial system in December of 2010. Since December 2010, MMFs increased the concentration risk of open market paper, while simultaneously abiding by the SEC's diversification requirements. By 2015, MMFs held almost 80% of the open market outstanding within their portfolios. In 2016, the concentration of MMFs holding open market paper plunged due to the ratification of the 2014 reforms. This decline is due to the entirety of the 2014 reforms; prime institutional funds were significantly reduced and, in turn, reduced their total net asset holdings, as can be seen in Figures 13 & 14.

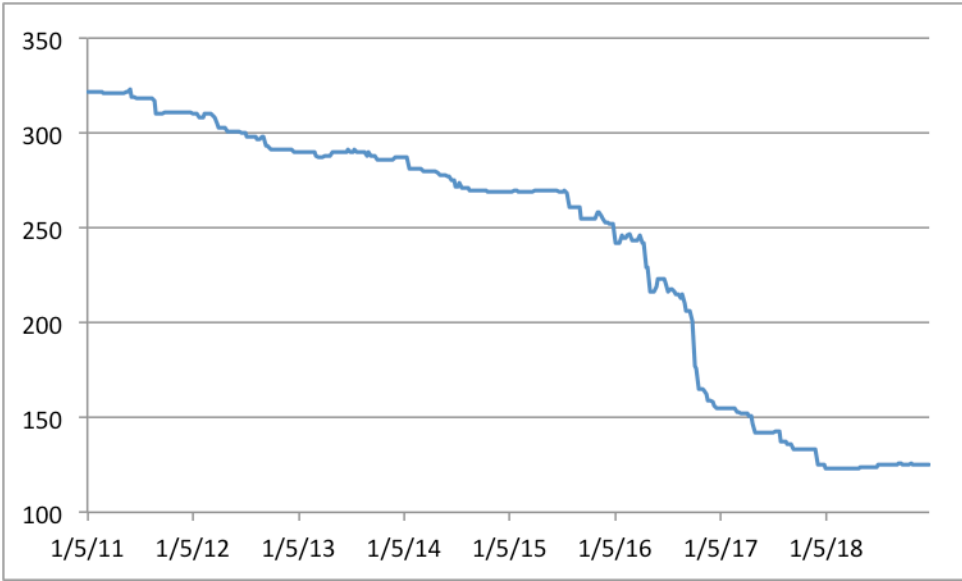
⁴⁸ In reference to our analysis of, bankers' acceptances issued by private depository institutions were roughly \$112 million in Quarter 1 of 2011 and were reduced to \$0 in Quarter 3 of 2013.

Figure 12: Open Market Paper in MMFs / Open Market Outstanding



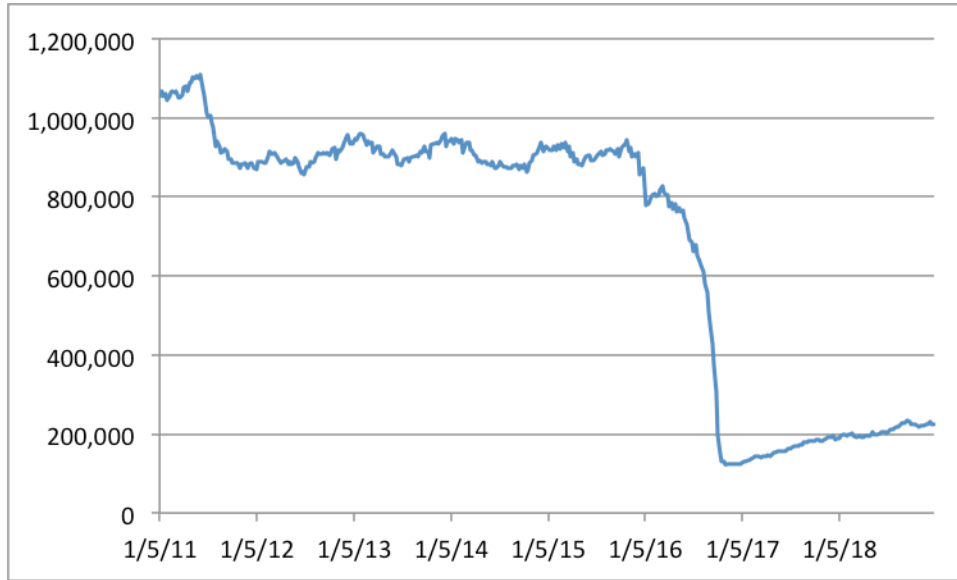
Source: Federal Reserve Flow of Funds

Figure 13: Number of Prime Institutional MMFs



Source: Investment Company Institute

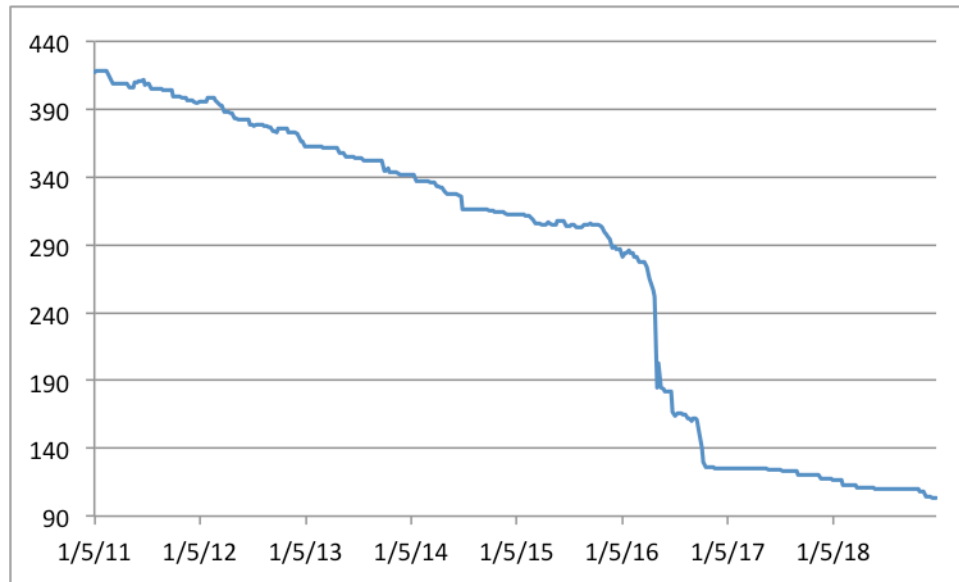
Figure 14: Prime Institutional Total Net Assets



Source: Investment Company Institute

Figures 13 & 14 show the severity of the 2014 reforms on prime institutional funds in the very beginning of 2016. Since the 2010 reforms, the number of prime institutional funds were already in decline after the financial crisis of 2007-2009. In the beginning of 2011, there were slightly more than 350 prime institutional funds, however, once the 2014 reforms were ratified in 2016, prime institutional funds decreased significantly and have settled in 2018 to roughly 125 funds. As the number of prime institutional funds were declining – so were their total net assets, as can be seen in Figure 14. After total net assets settled at their lower level at the end of 2016 there has been an increase until the end of 2018 – a small, but appreciable increase. Prime institutional funds were rapidly diminishing throughout the process of reform, but we must take care to remember the floating NAV reform did not apply to prime retail funds. We present the evolutionary graph of the number of prime retail funds in Figure 15 below.

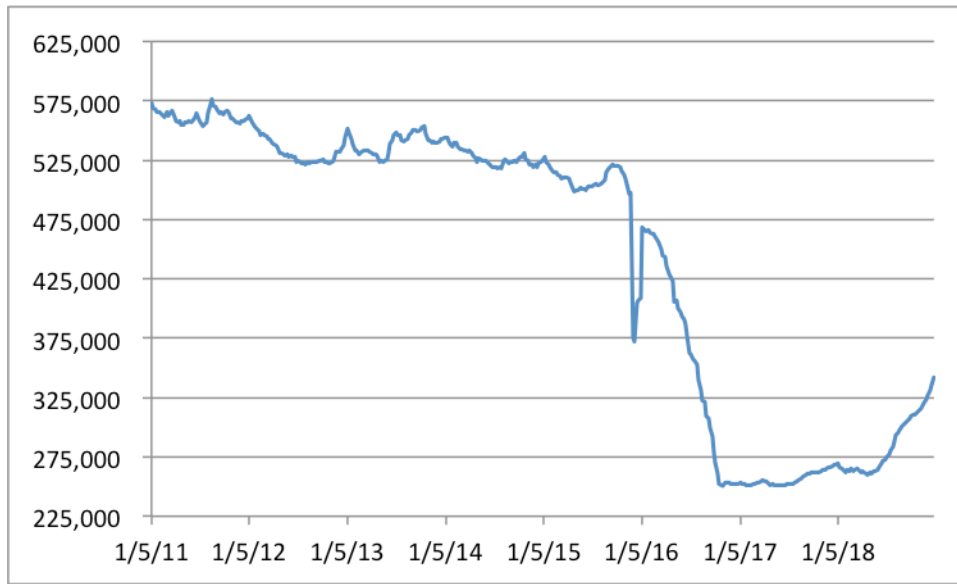
Figure 15: Number of Prime Retail MMFs



Source: Investment Company Institute

The effect of the 2010 and 2014 reforms had an almost identical affect on prime retail funds as they did on prime institutional funds. Prime retail funds experienced a considerable decline after the financial crisis of 2007-2009 and experienced a steeper decline in funds in comparison to prime institutional funds. In 2016, prime retail funds also experienced severe contractions within the industry due to the ratification of the 2016 reforms. This is interesting to note, since if these types of funds did not markedly decline in 2016, a serious argument could have been made as to whether a floating NAV did in fact cause the drastic decline in the prime institutional fund sector. Fees and redemption gates were the other aspect of the 2014 reforms, so there is no logical argument that can be put forth for the floating NAV reform being the sole cause a decline in the prime institutional sector; the same decline was experienced by prime retail funds as well. In the beginning of 2011, there were between 390 and 440 prime retail funds in operation but by the end of 2018 there are less than a 100 prime retail funds in operation. As was the case with prime institutional funds total net assets, prime retail funds total net assets show similar results, as can be seen in Figure 16.

Figure 16: Prime Retail MMFs Total Net Assets



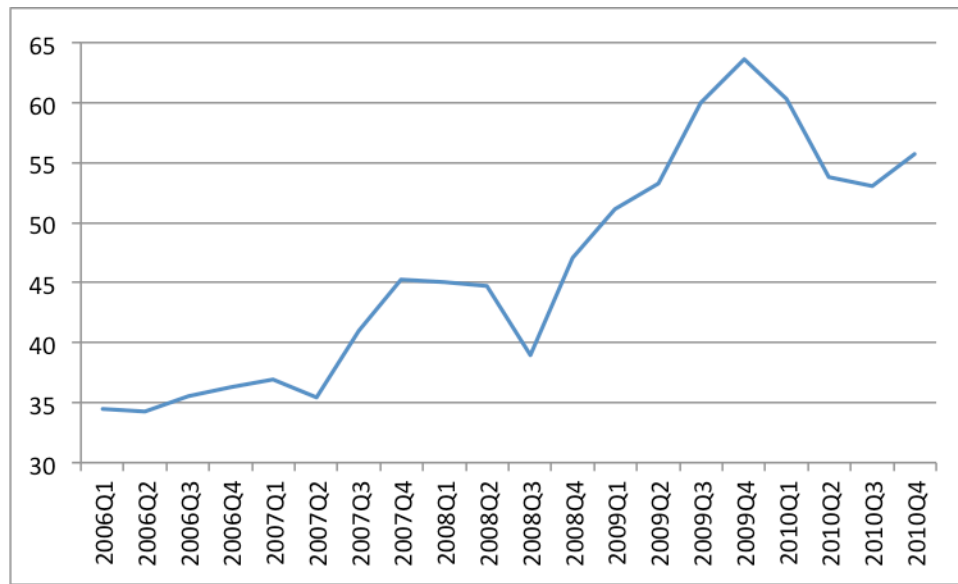
Source: Investment Company Institute

Total net assets of prime retail funds were relatively stable from the beginning of 2011 to the beginning of 2016. Once the 2014 reforms were ratified in 2016, total net assets of prime retail funds dropped significantly due to the decrease in the number of prime retail funds. Total net assets remained stable from the middle of 2016 until roughly the second quarter of 2018, but there has been a considerable rise through the end of 2018. The notable aspect of this increase in total net assets of prime retail funds is while this figure has been increasing the number of prime retail funds has been decreasing, so there are a decreasing number of funds with an increasing amount of total net assets.

To drive the point home in reference to concentration risk, we can clearly see in Figure 12 above, the amount of open market paper (commercial paper, since bankers' acceptances are \$0) has been increasing since Quarter 1 of 2017. Examining Figure 12, we see in Quarter 1 of 2017, MMFs held roughly 25% of the outstanding commercial paper within their portfolios; however, by the end of 2018 they held a little over 40% of the outstanding paper. Simultaneously, the number of prime institutional and retail funds has been declining, while their total net asset holdings have been increasing over relatively the same time period. So, the immediate effect of the ratification of the 2014 reforms in 2016 caused widespread declines in the number and total net assets of funds. Once the prime MMF industry "found" their place after the reforms, they have been increasing their holdings of commercial paper further. In doing so,

prime funds pose an equal threat to the financial system as they did when Lehman Brothers defaulted on its commercial paper on September 15, 2008. The threat prime funds pose to the financial system is equivalent because they hold roughly the same amount of outstanding paper within their portfolios as they did when Lehman Brothers filed for bankruptcy, as can be seen from Figure 17. Additionally, the number of prime funds has dramatically declined. The last nine years has resulted in fewer prime funds holding roughly the same amount of outstanding open market paper, which was held by roughly four times the number of prime funds in the financial crisis of 2007-2009, with evidence of this being provided in Figure 17.

Figure 17: Open Market Paper Held in MMFs Throughout 07-09 Financial Crisis



Source: Federal Reserve Board

Finally, the most widely discussed reform the SEC implemented in the 2014 reforms is the floating NAV. The SEC’s reasoning behind this reform was to enhance investors’ understanding that investing in a prime institutional fund was risky since the underlying securities fluctuate in value. The ultimate goal of a floating NAV is to reduce the first-mover advantage of investors redeeming en masse when the shadow price of the fund fluctuates below the constant NAV or “posted” \$1 NAV. In conjunction with a floating NAV, all MMFs can implement liquidity fees and redemption gates at the board’s discretion. A maximum liquidity fee of 2% can be implemented for investors redeeming shares or a fund can gate the redemption of shares for a maximum of 10 days in a 90-day period.

There was no underlying theory with respect to the SEC imposing a floating NAV on prime institutional funds except that of giving the belief that investors will be more attuned to the underlying price fluctuations within the portfolio, since they can witness the fluctuations within the floating NAV. In doing so, investors will be less likely to redeem shares in times of market stress. The skewed theory put forward by the SEC underlying the imposition of liquidity fees by MMFs resides in Daniel Kahneman's work within his book entitled *Thinking, Fast and Slow* in 2013. The SEC claims within the 2014 reforms "research in behavioral economics suggests that liquidity fees may be particularly effective in dampening a run because, when faced with two negative options, investors tend to prefer the option that involves only possible losses rather than the option that involves certain losses, even when the amount of possible loss is significantly higher than the certain loss" and directly cites Kahneman's book within a footnote (SEC 2014, 53). Similar to a lack of theory provided for a floating NAV, there was further lack of a theory put forward in relation to the use of redemption gates by MMFs from the SEC. The only relation to a theory put forward by the SEC in relation to redemption gates is reflected in their analysis that gates will help MMFs during crises by providing them with the necessary tools to "generate additional internal liquidity" in order to keep themselves afloat (SEC 2014, 647).

It can be argued that the underlying theory for all three of the 2014 reforms could be related to the cited work of Kahneman within the 2014 reforms. We do not need to examine Kahneman's actual theory provided within his book to understand how the SEC adopted it as a justification for implementing liquidity fees. If one reads Chapter 26 entitled Prospect Theory within *Thinking, Fast and Slow*, the chapter referenced by the SEC, one would observe Kahneman is talking about gambling and risk aversion within prospect theory. It is correct that Kahneman does in fact state a person will choose a certain loss over an uncertain loss, but he is doing so in the context of gambling. The essential takeaway from Kahneman's book is that if there are two individuals, one has \$1 million and the other has \$4 million, and they are given an opportunity to flip a coin to earn \$2 million or \$3 million – the individual who already has \$4 million faces a certain loss. On the other hand, the gambler who has \$1 million cannot lose in this scenario since he/she will earn \$1 or \$2 million from the flip of a coin. Therefore, the SEC arrives at the conclusion an investor will choose a certain loss rather than an uncertain loss. The application of this to regulation is not obvious. However, the reform was ratified in 2016. Regardless of whether the assumption underlying the 2014 reforms is correct or incorrect, we

can provide a theory as to how investors will actually react with a floating NAV, or the threat of a liquidity fee and redemption gate being imposed on their investment.

The first is to remember all investors have a liquidity preference, which was put forward by John Maynard Keynes in, *The General Theory of Employment, Interest, and Money* in 1936. Keynes arrives at the liquidity preference of an investor by asking two basic questions: Does an individual want to hold cash (liquidity) now or is the individual willing to part with his money (liquidity) for a specified amount of time in order to realize an expected profit at a predetermined date in the future? The definition given by Keynes in terms of liquidity preference is “a schedule of the amounts of his resources, valued in terms of money or of wage-units, which he will wish to retain in the form of money in different sets of circumstances” (Keynes 1964, 166). There are three aspects to liquidity preference: the transactions-motive, the precautionary-motive, and the speculative-motive for money. The transactions motive is “the need for of cash for current transaction of personal and business exchanges,” the precautionary-motive is “the desire for security as to the future cash equivalent of a certain proportion of total resources,” and, the speculative-motive relates to “the object of securing profit from knowing better than the market what the future will bring forth” (Keynes 1964, 170,).

Liquidity preference theory expressed by Keynes signifies three different motives as to how an individual prefers to hold money. It can be assumed during economic downturns individuals will hold their money in the form of cash, which can be considered under the precautionary motive. On the other hand, if market conditions are in a state of euphoria, individuals will tend to invest their money into speculative assets, such as equities, bonds, or shares issued by MMFs, therefore, satisfying the speculative demand for money. Lavoie (2014) extended the concept of liquidity preference through the use of matrix algebra in order to show the holdings of different assets held in the portfolios of households. We can extend this analysis and claim households hold a proportion of their wealth, denoted by V , in shares issued by an MMF and this can be denoted as S_h . We can also assume households also hold a proportion of their wealth in demand deposits at banks, denoted by D_h and in long-term bonds, denoted by B_h . The matrix can be extended to encompass all of the assets held within household portfolios, however, we are only incorporating three assets for simplicity. In matrix form the model is:

$$\begin{bmatrix} D_h \\ p_{B_h} B_h \\ p_{S_h} S_h \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \\ \lambda_{30} \end{bmatrix} V + \begin{bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} \end{bmatrix} \begin{bmatrix} r_D \\ r_B \\ r_S \end{bmatrix} V + \begin{bmatrix} \lambda_{14} \\ \lambda_{24} \\ \lambda_{34} \end{bmatrix} Y^{49}$$

As Lavoie (2014) mentions each of the “ λ_{ij} parameters act as indicators of liquidity preference for the various assets” (Lavoie 2014, 240). Finally, Y denotes the income of households. Let us clearly explain what the matrix above is telling us. The first line of the matrix states household demand for demand deposits is equal to:

$$D_h = (\lambda_{10} + \lambda_{11}r_D + \lambda_{12}r_B + \lambda_{13}r_S)V + \lambda_{14}Y^{50}$$

which states “that the demand for deposits is a proportion of wealth V and of income Y (the transaction demand for money), and that the proportion of wealth is given by the parameter λ_{10} , but that this proportion is modulated by the rates of interest on deposits,” long-term bonds and the shares of MMFs (Lavoie 2014, 240). The first parameter λ_{11} must be positive because when interest rates are higher, households will hold more of their wealth in demand deposits in comparison to the other two assets in the model. The other two parameters λ_{12} and λ_{13} are negative since when interest rates on the latter two are higher than demand deposits this should induce households to hold less of their wealth in demand deposits and more in either long-term bonds or MMF shares.

Examining the second row of the matrix presented above results in household demand of long-term bonds, which is given by the equation:

$$B_h = (\lambda_{20} + \lambda_{21}r_D + \lambda_{22}r_B + \lambda_{23}r_S)V + \lambda_{24}Y$$

The second parameter within this equation, λ_{21} , must be positive because if the interest rate on long-term bonds is higher than demand deposits or MMF shares, households will hold more of their wealth in long-term bonds. Additionally, the other two parameters λ_{21} and λ_{23} are both negative since when the interest rate on demand deposits and MMF shares are higher in comparison to long-term bonds, households will hold less of their wealth in long-term bonds

⁴⁹ Matrix based upon (Lavoie 2014, 240)

⁵⁰ (Lavoie 2014, 240)

and more in either demand deposits or MMF shares. Finally, examining the third row of the matrix provides us with the demand for MMF shares by households:

$$S_h = (\lambda_{30} + \lambda_{31}r_D + \lambda_{32}r_B + \lambda_{33}r_S)V + \lambda_{34}Y$$

The third parameter, λ_{33} , within the equation above is positive since if the interest rate on MMF shares is greater than demand deposits or long-term bonds, households will hold more of their wealth in MMF shares. Furthermore, the remaining two parameters λ_{31} and λ_{32} are negative since when the interest rates on demand deposits and long-term bonds are higher relative to MMF shares, households will hold less of their wealth in MMF shares and hold more of their wealth in demand deposits or long-term bonds. The parameters λ_{14} , λ_{24} , and λ_{34} are all positive since, if households have a higher income they will then have a larger amount of transactions thereby allowing them to have greater wealth in demand deposits, long-term bonds, or MMF shares (Lavoie 2014). There are two mathematical restrictions to the model presented above: one is the vertical adding-up condition and the other is the concept of symmetry.

The vertical adding-up constraint states “the total of the desired proportions of each asset must sum to unity,” or in more simple terms: “the sum of the demands must be equal to wealth” (Lavoie 2014, 240). Furthermore, in order to increase or decrease a specific asset within the portfolio an individual must decrease or increase the other assets within the portfolio. Following this restriction we find the parameters sum to unity:

$$\lambda_{10} + \lambda_{20} + \lambda_{30} = 1^{51}$$

Since we have the vertical adding-up constraint in which a household must reduce their holdings of one security in order to increase their holdings of another security, we also have symmetry within the model. Symmetry, in mathematical form is:

$$\lambda_{ij} = \lambda_{ji}^{52}$$

where, $i \neq j$, and this states if, for example, there is an increase the interest rates on MMF shares, households will increase their demand of MMF shares in comparison to, say, for example, long-term bonds. So, put simply, symmetry shows when the rate of interest changes for a specific asset while the other assets interest rate do not change, households will alter their portfolios in order to appreciate the increase in the better yielding asset.

⁵¹ (Lavoie 2014, 240)

⁵² (Lavoie 2014, 240)

Incorporating the above analysis into the 2014 reforms relating to a floating NAV and the possible imposition of a liquidity fee or redemption gate becomes very clear as to what investors will actually do in times of crisis. Since we have denoted the shareholders to be households let us deal with retail MMFs first. As was already mentioned in Chapter 2, retail investors (households) do not redeem en masse during times of crisis as witnessed throughout the 2007-2009 financial crisis. However, even if households ran from MMFs in a future crisis, the threat would be mitigated due to funds being allowed to implement a liquidity fee of up to 2% or a redemption gate. We must remember retail MMFs still price at a constant NAV; therefore, they still have the risk of breaking the buck and as we have seen with the amount of fictitious liquidity in prime retail MMF portfolios, this is still a very large concern.

Suppose there is another crisis and prime retail MMF shareholders decide to run on the fund. Let us also suppose prime retail shareholders have only two other asset options to switch to; demand deposits or long-term bonds. As can be seen from the vertical adding-up constraint as well as symmetry these investors will move out of MMF shares and into either demand deposits or long-term bonds. We can argue this to be the case since investors will shift out of a speculative-motive and into a precautionary-motive because of their own uncertainty as to the future. We must also note the price of MMF shares will change since redemptions will be occurring. If a prime retail MMF does not act quickly to implement a liquidity fee or redemption gate due to the stigma of imposing such a fee or gate during a downturn, the MMFs own viability will become threatened. If this were to occur then prime retail MMFs would have to sell assets at fire-sale prices once again in order to meet the redemption requests by retail investors. Consequently, another run could ensue, as witnessed in the 2007-2009 financial crisis, which could result in another freeze within the commercial paper market. As was already mentioned, MMFs own roughly 40% of the outstanding open market; therefore, the plausibility of the commercial paper market freezing due to a run on MMFs can be claimed with a significant degree of probability.

Turning to what would occur within prime institutional MMFs, we reclassify the above matrix from household shareholders to prime institutional shareholders, the analysis remains the same. The only difference in analyzing prime institutional shareholders is that prime institutional funds employ a floating NAV. Since institutional investors are acutely aware of market disturbances we can put forth an evolutionary biology theory in conjunction with the mathematics above for liquidity preference. In John Bargh's book *Before You Know It* he

provides a detailed description as to how humans react to certain scenarios. The analysis Bargh undertakes relates to the decisions individuals make in real-time within the real world. Bargh begins by noting that individuals who are participating in a psychology test have buttons to push in order to move onto the next question or statement within the test. However, when he was almost hit by a bicycle he experienced an immediate fight or flight response and jumped to the sidewalk. Bargh thinks to himself, he did not have a button to stop the world in order to determine whether he should move or stay in the dangerous scenario; he reacted automatically and jumped back on the sidewalk to avoid being hit. So, Bargh employs a psychology test without the use of buttons in order for the participants to stop and think about the responses they will give – he conducts a real-time psychology test where individuals must process the information within the test in real-time as the real-world operates.

The psychology test Bargh presents to the individuals participating involves determining whether a fictitious person is good or bad. In order to do this, Bargh has two different tests – the first test has 24 distinct statements, 12 good, 6 neutral, and 6 bad statements about an individual. The second test also has 24 statements, 12 bad, 6 neutral, and 6 good. The results Bargh obtains are exactly similar his reactionary response of jumping back onto the sidewalk unconsciously when he was almost hit with a bicycle. The participants of the test who valued honesty and dishonesty as to the traits they most value in a person were able to determine whether or not the fictitious was in fact honest or dishonest. However, the participants who did not value honesty and dishonesty as a distinguishing trait of an individual could not determine whether or not this person was honest or dishonest in real-time. Therefore, Bargh provides evidence as to how people will react in real-time when faced with making judgments about an individual.

Implementing Bargh's analysis on prime institutional investors we would reach two different conclusions; one where prime institutional investors would remain in the fund and the second where they would redeem. We arrive at two different conclusions since Bargh presents *two* sets of questions to participants within his test. Furthermore, we must recall the way in which Bargh constructs his test and how events unfold in the market. The test randomly distributes the statements and there is also no distinct pattern of events developing within the market.

The first "test" we conduct is a case where we have 24 statements, as in Bargh's analysis, with 12 good events, 6 bad events, and 6 neutral events. This first test represents a relatively stable market due to the good events outweighing the bad events by a factor of two to

one. Prime institutional investors foremost concern is maintaining their minimum principal investment of \$1 million, since this is usually the least amount of money prime institutional funds will accept as an investment. Similar to Bargh's analysis of people who value honesty and dishonesty in judging people, prime institutional shareholders value maintaining their principal investment. Since this is the prime institutional shareholders' purpose they would be able to look through the market noise of 6 bad and 6 neutral events occurring and will remain in the fund without redeeming their shares. Therefore, under our first scenario prime institutional investors will not run on the fund causing destabilizing effects on the fund nor the overall market.

The second test corresponds to a market downturn where prime institutional investors encounter 12 bad events, 6 good events, and 6 neutral events. In such a scenario it is also well advised to recall prime institutional MMFs have discretionary powers to implement liquidity fees and redemption gates and prime institutional investors are well aware of this datum. As the events of a market downturn are unfolding prime institutional investors will start to become increasingly risk-averse as they begin to realize there are double the amount of bad events occurring in comparison to good events. Risk-aversion will begin to exponentially increase since prime institutional investors will start becoming jittery as to what the market may do next and they will want to protect their minimum principal investment. Referring to Keynesian uncertainty, we see "not only some premises may be unknown at the moment of decision but they may actually be unknowable," since investors cannot accurately predict the future they will begin to assume the current state of affairs (of a worsening market) will be projected into the future (Carvalho 1985, 75). Therefore, in order for prime institutional investors to protect their minimum investment they will begin to redeem their shares, and, once a large redemption occurs, others are certain to follow.

The result of prime institutional investor redemptions will have negative effects on prime institutional MMFs. Redemptions will significantly decrease the NAV since the funds must mark-to-market the underlying assets, since, in order to meet redemptions funds will have to sell their most liquid securities. Or, if the funds board finds it necessary to implement a liquidity fee or redemption gate they will do so in order to save themselves from a possible breaking-of-the-buck. If the fund does charge a liquidity fee during this downturn investors will still redeem their shares despite knowing they will be charged a maximum of 2% for doing so. We can claim this statement to be true since prime institutional shareholders "will be subject to

waves of optimistic and pessimistic sentiment” as they learn of the events occurring (Keynes, 1936, pp. 154). Due to the bad news outweighing the good by a factor of two to one prime institutional investors will be more than willing to pay a liquidity fee of 2% in order to protect their principal since their main concern will be whether or not the fund can withstand the shocks and if it cannot they will lose all of their money not only 2% due to a liquidity fee. In relation to the above analysis of liquidity preference prime institutional shareholders will rapidly shift out of the speculative motive (holding MMF shares) and into the precautionary motive of holding their liquidity in cash where there is zero risk of loss.

In the case of the fund implementing a redemption gate within the scenario described above, the analysis becomes murky. Prime institutional investors are still encountering the 12 bad events, etc., occurring. However, they will begin to wonder how other prime institutional investors are reacting to the news everyone is experiencing. By taking expectations about future events you wind up with future volatility since expectations can change rapidly which will then impact the current market. In doing so, prime institutional investors will rush to redeem their shares in order to alleviate the possibility of a gate due to other investors redeeming their shares beforehand. Again, prime institutional shareholders will move into the precautionary motive from the speculative motive within our model in order to escape from the fund.

In each scenario the NAV of the fund has yet to be considered. Whether prime shareholders redeem their shares with the implementation of a liquidity fee or the possibility of a redemption gate this will significantly impact the NAV of the fund. As was previously mentioned, funds will have to sell assets in order to meet redemption requests if they do not implement a liquidity fee or redemption gate. For funds implementing a liquidity fee of 2%, this will obviously not be considerable enough in order to provide the funds with additional liquidity to meet future redemptions it will only slow the flood of redemptions by 2%. The floating NAV does “accurately” portray price movements of the underlying securities; however, it does nothing to prevent investors from redeeming their shares when their liquidity preference changes to a precautionary motive, nor does a floating NAV ameliorate the effects of the entire base of prime shareholders liquidity preference shifting to a precautionary motive during a market downturn.

In order to alleviate the downside effects of the 2010 and 2014 reforms, the SEC must examine the effects of the reforms on prime MMFs in the aggregate, rather than in the micro-sphere in analyzing Form N-MFP data. In order to alleviate the ever-present run risk the SEC

should dismantle the liquidity fee and redemption gates currently in place and implement the minimum balance at risk as proposed by (McCabe, et al, 2012) within the Federal Reserve Bank of New York. In this they present the minimum balance at risk (MBR) proposal in such a way as to definitively prove this would result in zero run risk from any and all MMFs during normal and crisis periods. The essence of the MBR proposal is if an investor decides to redeem their shares at any moment of time the investor will face a minimum balance of their initial investment at risk of loss. So, for example, if an investor wants to redeem their shares, McCabe, et al (2012) propose an arbitrary number, say 5%, of the investors funds remaining in the fund for a period of thirty days. An excellent particular of this proposal is that the investor will be required to maintain 5% of the initial investment within the fund for at least 30 days regardless of whether the market is in a state of bliss or there is turmoil. The risk of loss to all investors in every type of MMF would be a 5% loss, since the fund will keep this percentage in order to cover losses on assets that are experiencing trouble or to maintain sufficient liquidity levels.

However, a 5% MBR would be of little use to all MMFs throughout a crisis, so the proposal we have formulated would be to extend this percentage to 25%. The sole purpose of every MMF imposing a MBR of 25% relates to equality between all MMFs, whether they are the riskiest, such as prime institutional MMFs or government MMFs, which are the safest. Every single MMF would implement a 25% MBR rule in order to alleviate financial regulation arbitrage between funds. Secondly, if we remember the analysis given above with respect to investors redeeming in times of crisis, clearly Keynesian liquidity preference theory states investors will redeem their shares and would be willing to take a 2% loss in order to preserve their principal amount of liquidity. In the case of investors subject to forgoing 25% of their liquidity with our proposal, we find it unlikely that prime institutional investors, with a minimum investment of \$1 million, would be willing to lose \$250,000 in order to only receive three quarters of their initial investment. The 25% MBR is high enough to *force* heavy redeeming shareholders to stay in the fund in order to absorb any potential losses the fund experiences instead of the Federal Reserve socializing the losses by creating another “fancy” facility as occurred in the 2007-2009 financial crisis. Additionally, if prime institutional investors were to sacrifice a quarter of their initial investment the fund would have plenty of actual cash on hand in order to alleviate their current problems instead of having to sell assets in order to meet redemptions. Investors redeeming their shares in times of crisis with a 25% MBR would also ameliorate the risks of imposing losses on shareholders that do remain in the fund,

since the MMF could use the 25% of redeeming shareholders funds to mitigate losses to the fund, thereby alleviating the risk of shareholder dilution.

Furthermore, since sponsors of MMFs are not required to provide support to their MMFs, we also propose mandating sponsor support no matter the circumstances, similar to (Fisch, 2015). Financial firms excel at alleviating laws put in place and we would also propose that a sponsor of an MMF cannot treat the MMF as a subsidiary to work around the law of mandatory support. If one sponsors a fund that firm cannot, once the law is put in place, no longer support the fund; the sponsor will have two options, one to continue to provide support the other to close the fund down itself. The problem with mandating sponsors to provide support unconditionally to funds leads in the capital adequacy constraints sponsors face. In market turmoil, every financial institution is experiencing liquidity problems that could transform into sufficient capital problems in order to withstand the gyrations occurring in the market. Therefore, rules and regulations would have to be implemented in order to ensure the sponsor can unconditionally provide support to the funds sponsored in normal as well as market downturns, but this is research for further work. In summary, a 25% MBR rule, in conjunction with mandatory sponsor support, would ultimately reduce the risk of shareholders running on the fund in times of market stress and would ensure the fund was provided adequate support should such runs or other risks develop which threaten the funds viability.

There is a tremendously large missing piece within the MBR rule proposed above as well as mandatory sponsor support. Both of these proposals do not directly make the financial system or the funds themselves safer. A substantive proposal, which should be considered seriously is the complete elimination of commercial paper from *all* MMFs portfolios. The holdings of commercial paper throughout the financial crisis of 2007-2009 caused the difficulties within MMFs. The analysis provided above in relation to concentration risk also suggests commercial paper will be at the heart of the turmoil within MMF portfolios throughout the next financial crisis. So, the only logical way to remove the risk of commercial paper threatening the stability of MMFs is to extinguish it from their portfolios. If commercial paper is made illegal for all MMFs to obtain, the obvious question becomes who will purchase it, and this is what the SEC would have to determine. Furthermore, the actual problem is not MMFs buying it for their portfolios, this is completely rational on their part. The problem is the issuance of commercial paper by conduits securitizing assets, along with financial and nonfinancial companies issuing commercial paper. Financial companies issuing commercial

paper should be illegal since the money used from the sale of it is used for “working capital,” but future research would most likely conclude the use of proceeds is for speculation or as a means of taking position in assets rather than deposits. Finally, nonfinancial firms issuing commercial paper likely is for the use of working capital, however, the U.S. economy would be far better off with a process of de-financialization and firms using earned profits to finance their operations instead of issuing exponential amounts of debt that will only lead to a continuous series of debt-deflationary recessions.

Not only should the SEC ban all MMFs from holding commercial paper, but they should undertake analysis as to what is in the repurchase agreements MMFs are dealing in as well. Furthermore, the SEC should ban MMFs from holding ABS, even though it is a miniscule holding, from their portfolios. None of these securities provide anything sufficient for the domestic economy to produce employment or contribute to actual productive output. What is needed is a return to the reason why MMFs were introduced to the financial system in the first place, to allow retail investors to earn interest on *safe* assets, such as U.S. Treasuries. A logical way to reduce overall systemic risk is to purge it from the system rather than transferring it from institution to institution.

CONCLUSION

MMFs experienced exponential growth when they were first introduced in 1974 remaining relatively stable until the mid-2000s when assets again grew significantly. We have shown the MMF industry has grown in tandem with open market paper, or more commonly, the commercial paper market which MMFs grew by demanding high amounts for their portfolios. We have also provided a detailed analysis as to the causes and consequences of MMFs throughout the financial crisis of 2007-2009 and how the Federal Reserve as well as U.S. Treasury helped save the industry.

Moreover, we have detailed both the 2010 and 2014 reforms placed upon the MMF industry by the SEC. The 2010 reforms were set forth shortly after the 2007-2009 financial crisis and directly addressed eligible securities, the number of NRSROs rating securities, maturity and liquidity levels of portfolios, stress testing, determining counterparty credit risk, and suspension of redemptions. The 2014 reforms implemented a floating NAV for prime

institutional funds, liquidity fees, redemption gates, simultaneously enhancing disclosure, diversification, and stress testing requirements. In analyzing both the 2010 and 2014 reforms, we have provided a detailed description of how the financial composition of MMFs has changed with reference to commercial paper.

We have shown MMFs only became riskier after the 2010 reforms and slightly less risky after the 2014 reforms with respect to their holdings of commercial paper. It is readily apparent there are considerably fewer MMFs currently in comparison to the financial crisis experienced from 2007-2009 with an almost equal percentage of holdings of commercial paper within their portfolio. It has been shown the reforms did not address the concentration risk an entire industry faces that poses an equal or greater amount of risk to the overall financial system in comparison to the threat posed during the 2007-2009 financial crisis.

The only way to combat the risks posed by MMFs is to implement an MBR rule upon the entire MMF industry where investors would be required to leave 25% of their initial investment in the fund upon redemption. In doing so, this will reduce the possibility of dilution to the remaining shareholders should investors redeem shares during market downturns. The 25% MBR rule would be high enough to deter redemptions in times of crisis while being small enough for funds to remain attractive to investors searching for a relatively safe investment. In addition to a 25% MBR rule, mandatory support by fund's sponsors would enhance the safety of the MMF industry should weakness materialize within the fund. In doing so, a sponsor would have to provide support unconditionally to the fund. Mandatory sponsor support would alleviate the risk of investor redemptions the MMF industry encounters during times of stress since the investors would be aware a sponsor would be obliged to act. Therefore, a high MBR rule of 25% in conjunction with mandatory sponsor support would fully mitigate redemption risk and would provide stability during market downturns.

In addition to the proposed 25% MBR rule and mandatory sponsor support we have argued it should be illegal for MMFs to hold commercial paper within their portfolios. The result of purging commercial paper from MMF portfolios would considerably enhance the safety of these funds while providing investors with a relatively risk-free asset. A disallowance of MMFs to purchase commercial paper would have to be carefully considered by regulators since this would create a demand gap for it, with the question being: who would fill the role of MMFs? The risks of who would become the purchasers are prevalent, however, the

concentration risk that has been highlighted would become non-existent within the MMF industry.

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