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Explaining the Life Cycle of Bank-Sponsored Money Market Funds: An Application of the Regulatory Dialectic*

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Abstract

In this paper, we present empirical evidence of the regulatory dialectic in the prime institutional money market fund (PI-MMF) industry. The “regulatory dialectic,” developed by Kane (1977, 1981), describes how banks and regulators react to each other. For decades, a cap on commercial deposit interest rates fueled dramatic growth in bank-sponsored PI-MMFs as a form of shadow banking. We show that during the growth period, banks with more commercial deposits were more likely to enter the PI-MMF industry in an effort to keep their commercial customers in affiliated subsidiaries. However, the 2008 crisis and subsequent re-regulation of the industry halted the rapid growth of PI-MMFs. In the post-crisis regulatory regime, we find that bank-sponsored funds were more likely to exit the industry than nonbank-sponsored funds. Simultaneously, the industry shifted from PI-MMFs to government institutional MMFs as substitute products. We conjecture that the collapse of the PI-MMF can lead further to the emergence of substitute products, such as stablecoins as part of the continuing dialectical process.

JEL Classification: G2, G21, G23, G28, H12, H81.

Keywords: bank, bank holding company, bank run, financial crisis, liquidity risk, money market fund, systemic risk, too big to fail.

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1. Introduction

Bank-sponsored prime institutional money market funds (PI-MMFs)¹ grew dramatically in the 1990s, followed by a precipitous decline in the 2010s. In August 1987, bank-sponsored PI-MMFs accounted for only 0.7 percent of the market share in the PI-MMFs industry. Over the next decade, however, bank-sponsored PI-MMFs reached a 50 percent market share, peaking in 2009 with more than \$600 billion aggregate total net assets (TNA). In the first quarter of 2009, 25 bank holding companies (BHCs) sponsored 153 share classes of PI-MMFs.² By the fourth quarter of 2016, however, only 14 BHCs, sponsoring just 59 share classes with a TNA of \$51 billion, remained in the industry.

In this paper, we show how the rise and the decline of the bank-sponsored PI-MMF industry provide the first empirical evidence of the regulatory dialectic framework proposed by Kane (1977) and developed by Kane (1981). Kane (1981, p. 355) describes the interplay between banks and their regulators as a balance between the “political processes of regulation and the economic process of regulatee avoidance [that], like riders on a seesaw, adapt continually to each other.” He argues that the intersection of politics and economics creates “a dialectical process of adjustments and counteradjustments.” For example, if regulation limits a bank from pursuing a profitable activity, it has a strong incentive to circumvent the regulation by developing a less regulated substitute product or service that closely mimics the regulated activity. Avoidance and evasion absorb resources from other uses raising the costs of performing the previously unregulated activities. Avoidance frustrates supporters of the regulation, who advocate for the re-regulation of the novel ways of performing the activity. Banks then seek to circumvent the new regulation, and

¹ Also referred to as money market mutual funds.

² Shareholders of a given fund are separated into “share classes” based on their characteristics, for instance institutional or retail investors. Though all share classes of a fund are tied to the same portfolio of assets, the share classes can have different expense ratios and minimum initial investment requirements.

the process starts once again generating additional costs for society at large (see Eisenbeis (2023) for a retrospective).

The evolution of the bank-sponsored PI-MMF industry between 1988 and 2016 exemplifies how banks and regulators react to one another. We show that the growth of bank-sponsored PI-MMFs can be traced to the regulatory restrictions that prevented banks from paying interest on demand deposits. Banks faced disintermediation by commercial depositors who kept their funds in noninterest-bearing demand deposits. These deposits offered only implicit returns in the form of account services whereas institutional money market funds could offer market rates.

Because of the regulatory environment, commercial depositors had an incentive to move funds to accounts offering higher net (implicit and explicit) returns at money market funds.

Bank sponsorship of PI-MMFs emerged as a means of circumventing these regulations. By keeping bank commercial customers under a bank's corporate umbrella, the banks could counter potential disintermediation. This circumvention process allowed the bank-sponsored MMFs to pay interest on a product similar to a commercial deposit, while keeping the revenue generated within the corporate parent. One unintended consequence of the circumvention efforts was to increase the size of the so-called "shadow banking system." In aggregate, between 1986 and 2001, the banking industry experienced a massive reduction in noninterest-bearing deposits (our proxy for commercial deposits), while bank-sponsored PI-MMFs showed rapid growth.³ We complement this well-known aggregate evidence with fund-level analysis and show that BHCs that relied relatively more on commercial deposits and were thus more exposed to the threat of

³ In regulatory filings, commercial deposits are not reported as a separate item. We use noninterest-bearing deposits, which includes commercial and individual accounts, as a proxy for commercial accounts. See Section 2 for more detail.

disintermediation posed by interest-bearing MMFs, were more likely to start and sponsor a PI-MMF.

As predicted by the dialectical process, the 2008 crisis exemplified the nation experiencing a wasteful economic reaction to the existence of shadow banks. Indeed, the crisis had a profound impact on the PI-MMF industry, as government actions corroborated implicit safety-net coverage for “shadow banks” such as MMFs. For example, bank-sponsored shadow banks had no reserve or capital requirements and paid no fees to the FDIC for the risks their MMF affiliates created for the sponsoring banks (Acharya, Schnabl, and Suarez, 2013; Jacewitz, Unal, and Wu, 2022). As a result, the re-regulation phase of the dialectic took effect and federal regulation was extended to control the expansion of systemic risk inherent in these “loophole” deposit substitutes.

Re-regulation efforts during and post-crisis made sponsorship of PI-MMFs less attractive to sponsoring BHCs. Basel III required BHCs to hold additional liquidity against lines of credit to sponsored nonbank entities. In addition, the Dodd-Frank Act of 2010 repealed the statutory prohibition of interest rate payments on demand deposits and banks were allowed to pay market rates to their commercial depositors in 2011, decreasing the attractiveness of MMFs to investors. In addition, the Temporary Liquidity Guarantee Program (TLGP) also fundamentally changed MMF’s competitive environment and hampered the attractiveness of MMFs by extending unlimited deposit insurance coverage from October 2008 through 2010 to transaction accounts, a close MMF substitute, among other changes. Following TLGP, noninterest bearing transaction accounts remained temporarily covered under a provision of the Dodd-Frank Act starting in 2010 until the end of 2012.

Re-regulation made the bank-sponsorship of MMFs less lucrative and opened avenues for the second round of circumvention by BHCs. We observe two circumvention efforts. First, we show

that, from 2010 to 2013, when the regulations took form, bank sponsors were more likely to close their PI-MMF affiliates than nonbank sponsors. Commercial MMF customers affected by the PI-MMF closures possibly became bank customers since institutional investors did not switch from bank-sponsored to nonbank-sponsored funds; we do not observe any increase in the number or asset size of nonbank-sponsored funds. The second circumvention efforts focused on moving into substitute products. Our analysis on asset flows suggests that bank sponsors resorted to substitute products such as government institutional MMFs (GI-MMFs) in response to the re-regulation.

In addition to these regulatory reforms affecting bank-sponsorship, the Securities and Exchange Commission (SEC) brought “structural and operational reforms”⁴ in 2014, and new mechanisms that could restrict investors’ access to non-government funds. However, in contrast to the earlier bank regulatory changes, these SEC reforms affected primarily the MMF investors and not specifically the bank sponsors of MMFs. The new rules discouraged investor redemptions, while granting fund sponsors new tools, like liquidity fees and redemption gates that allowed them to limit their run exposure. Taken together, these measures shifted the run risk from the sponsor, who may have needed to cover asset losses, to the investor. GI-MMFs were exempt from the regulatory changes that applied to PI-MMFs because they had much more restrictive portfolios. Therefore, while the SEC reforms may have contributed to the decline in PI-MMFs, we would not expect any differential response between bank and nonbank sponsors. Consistent with this expectation, the empirical results show no differences in the exit decisions between bank and nonbank sponsors from 2014 to 2016.

Much of the qualitative narrative described above shaping the regulatory dialectic of institutional money market funds is well known. However, our results provide the first quantitative

⁴ See “SEC Adopts Money Market Fund Reform Rules”, Press Release (July 23, 2014), <https://www.sec.gov/news/press-release/2014-143>.

empirical evidence of the dialectic at the bank and fund level. Further, we find a difference in response to regulations of the BHCs relative to unregulated nonbanks, providing additional support to the regulatory dialectic hypothesis.

We organize the paper as follows. In Section 2, we present the regulatory dialectic and our hypotheses. Section 3 explains the data used in the analysis. In Section 4, describes the initial stage of the regulatory dialectic. That is, the regulatory environment of the 1980s and the corresponding circumvention efforts of the banking system. Section 5 explains the re-regulation efforts as a result of the 2008 crisis. In this section we also present our empirical tests of the re-regulation that contributed to the decline of these funds and the empirical tests of the circumvention actions by the BHCs. Section 6 discusses the ongoing regulatory dialectic. Section 7 concludes.

2. Regulatory Dialectic

According to the Stanford Encyclopedia of Philosophy, “Dialectics is a term used to describe a method of philosophical argument that involves some sort of contradictory process between opposing sides.” The Dialectic method goes back to the ancient Greek philosopher Plato who presented his back-and-forth arguments with Socrates. Hegel’s dialectics precedes in a thesis-antithesis-synthesis pattern, starting with a concept as a “thesis,” which then develops into a second concept that is opposed to the first or its “antithesis,” which in turn leads to a third concept, the “synthesis,” that unifies the first two. (Maybe, 2016).

Kane cleverly adapts Hegel’s dialectics to advance the concept of a regulatory dialectic (Kane 1977, 1981). This concept incorporates the interaction between political and economic pressures in regulated markets. Kane (1981, p. 355) describes the interplay between banks and their regulators as a balance between the “political processes of regulation and the economic process of

regulatee avoidance. According to Kane (1977), “this alternating adaptation evolves as a series of lagged responses, with regulators and regulatees seeking to maximize their own objectives, conditional on how they perceive the opposing party to behave.” The crux of the argument is that the intersection of politics and economics creates “a dialectical process of adjustments and counter-adjustments.” For example, if regulation limits a bank from pursuing a profitable activity, it has a strong incentive to circumvent the regulation by developing a less regulated substitute product or service that closely mimics the regulated activity. One significant downside of avoidance and evasion is that they absorb resources from other uses raising the costs of performing the previously unregulated activities. Avoidance frustrates supporters of the regulation, who advocate for the re-regulation of the novel ways of performing the activity. Banks then seek to circumvent the new regulation, and the process starts once again generating additional costs for society at large

Kane (1981) uses this framework to explain the evolution of U.S. banks and markets in the 1960s and 1970s. His core argument is that environmental uncertainty induces technological and regulation-induced innovation. His greatest insight is that, in an unregulated firm, an innovation can be justified by its technical productivity. However, in a regulated firm, an innovation can be justified as well, or even instead, by its value in regulatory avoidance.

The regulatory dialectic is closely related to, but distinct from regulatory arbitrage. The regulatory dialectic describes the continual process of regulate-circumvent-reregulate (the *thesis*, *antithesis*, and *synthesis*) driven by the opposing forces of differing regulator and regulatee objectives. Regulatory arbitrage, on the other hand, describes “financial transactions designed specifically to reduce costs or capture profit opportunities created by differential laws or regulations” (Partnoy, 1996). Thus, regulatory arbitrage can be the circumvention stage contained within the greater dialectic process.

Regulatory Restrictions

We use the regulatory dialectic framework to explain the life-cycle of bank-sponsored institutional money market funds. The set of regulations that restricted price competition for deposits represents the initial stage of the dialectic. Regulations precluded explicit price competition for commercial deposits in the early 1980s. Despite the removal of interest rate ceilings for demand deposits in 1980, commercial deposits remained non-interest bearing. This restriction enabled competition from exempt institutions, such as money market funds. Therefore, banks faced potential disintermediation and risked losing their commercial customer base.

The regulatory dialectic posits that in response to a regulatory environment, banks can resort to regulation-induced innovation. In other words, regulated banks may seek to reduce or circumvent the regulations imposed on them. This behavior establishes the following hypothesis for the institutional money market lifecycle:

Circumvention Hypothesis

During the second stage, circumvention, under the market pressures from money market funds, banks that are relatively more exposed to binding regulation will be more likely to sponsor an institutional money market fund. Specifically, banks with a higher level of commercial deposits are expected to enter into the institutional money market business at a greater rate. These funds cater to commercial customers and allow the sponsoring bank to maintain relationships with their commercial customers.

This stage can also be characterized by an unintended consequence of regulation. Under regulatory pressure, bank-entry into the relatively less regulated PI-MMF caused them to be an important part of the shadow banking system and have a significant effect on the systemic risk of

the aggregate financial system — as seen during the 2008 MMF Crisis (Jacewitz, Unal, and Wu, 2022).

Re-Regulation

The third stage in regulatory dialectic is re-regulation. Often, re-regulation occurs as a result of an economic crisis that involves the new activities emerge during the circumvention stage. Indeed, the 2008 crisis clearly demonstrated the consequences of banks' circumvention of the deposit-price restrictions. The collapse of the Reserve Primary Fund and the subsequent run on money market funds showed that shadow banks, such as PI-MMFs, benefited and thus extracted value from the government safety net and that they represented a systemic risk. In Kane's framework, this realized risk generated political pressure to re-regulate the economic activity in its new form: the money market fund industry.

Following the 2008 crisis, a series of re-regulation efforts have been put in effect. The Basel III framework, implemented in the US in 2014, required liquidity reserves for bank subsidiaries' liquidity commitments to sponsored money market funds, increasing the cost of sponsorship. Concurrently, the Dodd-Frank Act eliminated Regulation Q allowing banks to pay market rates to commercial depositors. This eased the regulatory pressure on bank commercial deposits. Later, in 2014 the SEC adopted a structural and operational reform to mitigate the run-risk in MMFs. These rules became effective in 2016.

This new set of re-regulation efforts established the initial stage of the next cycle of the dialectical process, in which the regulatee seeks ways to circumvent these new regulations. We state the following hypotheses:

Re-Circumvention Hypotheses

Basel III and the removal of Regulations Q opened a new way for BHCs to engage in a re-circumvention of these new regulations. We hypothesize that bank-sponsored funds would react in two ways to the re-regulation efforts. The first, is that they would simply exit the institutional money market industry by ending its sponsorship of funds. Second, BHCs could directly offer their institutional investors substitute products, such as interest-bearing deposits or government institutional MMFs from the same fund complex. The latter was not subject to Basel III requirements after 2011.

In our analysis, we use nonbank sponsored MMFs to serve as instrument for identification of the regulatory dialectic. Basel III and the Dodd-Frank Act primarily affected the banking industry. Therefore, we expect to see the circumvention (substitution) only in bank sponsored funds. In contrast, SEC's MMF reform in 2016 primarily affected MMF investors. As a result, the investors of bank and nonbank MMFs were equally exposed to heightened risk, thus incentivized to move funds out of PI-MMFs of both sponsor types. Nevertheless, we should observe a stronger dialectic effect among bank-sponsored funds, since investors in nonbank sponsored funds may prefer bank deposits or even bank sponsored funds for safety reasons (e.g., because of their indirect access to the government's financial backstop (Jacewitz, Unal and Wu, 2022)).

3. Data

A money market fund (MMF) is organized as a portfolio of assets managed by an investment advisor. A management company (fund sponsor) can establish a new money market fund as a separate legal entity and simultaneously operate many individual and distinct funds. A large group of investors, or *shareholders*, own the portfolio assets. Each shareholder owns *shares* of the portfolio and can withdraw funds by redeeming shares. The money market fund's portfolio

generates a daily yield (return). The advisor collects a percentage fee, called an *expense ratio*, and shareholders receive the net yield.

Although the MMFs are considered default-free, shareholders still face the risk of their share values falling below par, also known as breaking the buck. Until the increased regulatory oversight in 2014, a money market fund could break the buck if its assets lost value such that the fund's per-share market value dropped much below its historical cost of \$1 (below \$0.995, to be exact). MMF sponsors play a critical role in preventing this from occurring. Sponsors are not generally legally obligated to provide support to their money market affiliates. However, they can implicitly guarantee to purchase at par assets that decline in value so that the MMF can meet redemption requests by the investors. Other forms of sponsor support include capital contributions, capital support agreements, letters of credit, and performance guarantees.⁵

We use data from *iMoneyNet*, which maintains detailed historical information on individual U.S. money market mutual funds since July 31, 1985. *iMoneyNet* collects available data across all U.S. money market funds and contains information on over 90 percent of all U.S. PI-MMFs.⁶

The dataset consists of share class-level observations. Each share class-level observation belongs to one specific fund, and each fund belongs to one specific fund complex. All share classes are claims on a common portfolio of assets, and thus share portfolio characteristics, such as total assets, gross yield, expense ratios, net yields, and weighted average maturity, and contain additional information on the asset composition of funds' portfolios. We aggregate share class data

⁵ Moody's (2010) provides examples of major sponsorship interventions and demonstrates that extensive instances of support were extended in 1994 and 2008. Indeed, sponsor support played a pivotal role during the crisis of September 2008. The SEC estimates that from August 2007 to December 2008, almost 20 percent of all PI-MMFs received sponsor support (SEC (2009), page 20).

⁶ Schmidt, Timmermann, and Wermers (2016) compare *iMoneyNet* data to statistics from the Investment Company Institute and find that *iMoneyNet* data cover about 93.5 percent of the dollar value of the entire U.S. Prime PI-MMF universe.

to the fund level by each fund's *master class name*⁷ (following Duygan-Bump, Parkinson, Rosengren, Suarez, and Willen, 2013; Strahan and Tanyeri, 2015; and Jacewitz, Unal, and Wu, 2022).

The *iMoneyNet* dataset contains a binary bank sponsorship identifier and a variable listing a sponsoring bank. The two sponsorship variables do not vary over time; the variables are fixed at values corresponding to a single date—the last date in each *iMoneyNet* dataset. To identify the sponsorship status of each fund complex, we manually match the name of each fund complex in our data to a bank or nonbank sponsor and build a sponsorship chronology for each fund complex using SEC filings and the business press. Next, we match each sponsoring bank to its Bank Holding Company Call Reports (FR Y-9C Reports) and Commercial Bank Call Reports (FFIEC 031/041/051) using the Federal Reserve's National Information Center Database (NIC). We define a fund complex as being *bank-sponsored* if it is owned (or held) by a bank holding company (BHC), a financial holding company (FHC) with a subsidiary commercial bank, or a commercial bank that is not a member of a holding company.⁸

Figure 1 shows the total net assets of PI-MMFs by sponsorship type from 1988 through December 2013.⁹ Each graph depicted in Figure 1 displays a distinct period with distinct behaviors in the PI-MMF industry during our sample period. The striking observation in the first graph is the relative growth of the bank-sponsored MMFs compared to the growth of the nonbank-sponsored MMFs between 1988 and 2000. While the total TNA for bank-sponsored PI-MMFs in 1988 is negligible, within 10 years they reached a 50 percent market share. During this period, and

⁷ In the data, this is identified using the Master Class Fund Name. When this value is missing, the fund's unique identifier (Fund Code) is used instead, thereby assuming that it is a single share class fund. This occurs in approximately 8 percent of the cases over the entire data span. The frequency of the missing data is generally higher earlier in the sample, peaks at 41 percent in 1993, and falls to nothing in 2003 and thereafter.

⁸ The definition of commercial bank excludes the following types of institution: industrial loan company, federal savings bank, savings and loan institution, savings and loan holding company, and credit union.

⁹ Our data source *iMoneyNet* has data on bank-sponsored PI-MMFs starting in 1988.

particularly in the first half, the growth rate in the bank-sponsored funds exceeded that of the nonbank-sponsored funds. This observation implies that the bank-sponsored funds attracted new institutional investment at a much faster rate than the nonbank MMFs.

The second graph shows that both sponsorship type funds progress at relatively similar levels from 2000 until the 2008 crisis, when the nonbank-sponsored funds experience a sharp decline relative to the bank-sponsored funds. Much of this steep decline can be attributed to the conversion of Goldman, Merrill Lynch, and Morgan Stanley to BHC charters. These institutions converted to BHCs in late 2008, ostensibly to gain access to the government's financial safety net, including insured deposits, but thereby accepting more rigorous regulatory requirements.¹⁰ In unreported analysis, excluding these three institutions show that both bank- and nonbank-sponsored funds experience similar declines. Nevertheless, even including the converted institutions, the decline in bank-sponsored funds is higher. Following the September 2008 shock, the TNA of bank-sponsored funds catches up to that of nonbank-sponsored funds. The trends diverge after 2009, as can be observed in the third graph: bank-sponsored funds' TNA decline after 2010 while the nonbank-sponsored PI-MMFs maintain their TNA levels.

Our empirical analysis explores the behavior depicted in these three graphs in the context of regulatory dialectic: why did bank-sponsored funds grow in the early 1980s, and why did bank-sponsored funds decline after the Global Financial Crisis (GFC) in 2008? These questions naturally divide our analysis into two periods of interest, namely, the circumvention period in the 1980s and 1990s and the re-circumvention period from 2010 to the implementation of Money Market Fund Reform in 2016.

¹⁰ See "Shift for Goldman and Morgan Marks the End of an Era", New York Times, (2008); <https://www.nytimes.com/2008/09/22/business/22bank.html>.

Table 1 summarizes the key variables in the two periods. Our analysis on the growth of the bank-sponsored PI-MMFs focuses on the BHCs' decision to sponsor PI-MMF business. Panel A of Table 1 examines the bank characteristics that determine the entry decision. We observe that BHCs that enter the PI-MMF industry, on average, possess higher levels of assets and commercial deposits but lower equity ratio than the non-sponsoring BHCs. On the other hand, in the re-circumvention period, we examine the fund characteristics that determine the exit decision. Panel B of Table 1 shows that BHC-sponsored funds have higher levels of TNA and are less risky in terms of weighted average maturity and risky holdings. The following sections examine these observations in a multi-variate setting.

4. Regulatory Restrictions and Circumvention

The initial stage of the regulatory dialectic is characterized by an environment with regulatory restrictions that give rise to incentives for regulation-induced technology innovation. Money market funds (MMFs), first introduced in 1971, are structured as registered investment companies under the Investment Act of 1940. They were not subject to deposit-rate ceilings (i.e., they were not subject to Regulation Q) and therefore could offer market rates. Between 1970 and 1980, banks experienced serious disintermediation due to competition from MMFs (Gilbert, 1986).

Bank sponsorship of PI-MMFs emerged during this period, as interest payments for savings accounts had ceilings and were prohibited on transaction accounts. Rate ceilings remained below market rates during much of 1966 to 1979, which caused large outflows of small denomination deposits from depository institutions to money market mutual funds (Gilbert, 1986). Congress eventually phased out Regulation Q for most types of deposits by passing the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) in 1980, reducing the incentives

for disintermediation. The Garn-St Germain Act of 1982 introduced Money Market Deposit Accounts (MMDAs), which were required to be “directly equivalent to and competitive with money market mutual funds” (§327).

Despite regulatory changes that allowed depository institutions to compete with the MMF industry for individual, nonprofit, and government accounts, commercial deposits were kept under Regulation Q and banks were prohibited from paying interest on commercial demand deposits. In this paper, we argue that the prohibition of paying interest on commercial deposits catalyzed disintermediation and incentivized the BHCs to circumvent these restrictions by organizing and sponsoring PI-MMFs outside of the traditional bank regulatory system (contributing to the creation of “shadow banks”).

Consistent with regulatory dialectic the sponsorship of a PI-MMF could allow banks to offer commercial customers an opportunity to earn market rates under the same corporate umbrella as the bank subsidiary and implicitly enjoy the same access to the safety net that banks uniquely hold. To quantify the effect of commercial deposits, we use the Call Report item “noninterest-bearing deposits” as a proxy for all types of commercial (business) deposits. Some consumers could also hold noninterest-bearing deposit (NIBD) accounts. However, given that regulations allowed consumers to hold interest-bearing near-exact substitutes (MMDA and NOW accounts), we find it unlikely that the NIBD account is populated with a material number of consumer accounts or that such funds represent a material fraction of noninterest-bearing deposits, especially after the mid-1980s.

To understand the determinants of PI-MMF sponsorship and the role of the disintermediation threat at the BHC level, we undertake two empirical tests. We first examine the entry decision and investigate whether BHCs that had a higher level of commercial deposits were more or less likely

to organize a bank-sponsored PI-MMF business. In the second test, we examine the BHCs' entry and expansion in the PI-MMF industry with a longer panel. Under our circumvention hypothesis, BHCs with a heavier reliance on commercial deposits would be most affected by the disintermediation in commercial deposits, and hence have a higher incentive to enter the MMF industry and grow their MMF businesses to keep the commercial customers within the banking group.

To construct the data for the first test, we identify the entry date of each bank-sponsored fund during the PI-MMF growth period (1988 to 1999) from *iMoneyNet*. We start in 1988 because of data availability. We end in 1999 because the growth of bank-sponsored PI-MMFs levels off and becomes equal to the nonbank-sponsored PI-MMFs. There are 44 distinct BHC sponsors entering during the PI-MMF growth period first quarter 1988 to fourth quarter 1999, while 1,456 BHCs did not sponsor a PI-MMF. These BHCs sponsored 139 funds at the end of 1999. We define entry as an occurrence of a fund-sponsor pairing that was not observed in the PI-MMF market in the previous quarter. We obtain data on BHC financial characteristics from bank holding companies' mandatory consolidated reports (FR Y-9Cs), which are filed quarterly by all U.S. regulatory high-holder BHCs.

The entry decision into the PI-MMF industry can be seen as a duration process in which each period a BHC chooses to enter or not conditional on having not entered previously. As a result, we use a Cox proportional hazards model (Therneau, Crowson and Atkinson, 2023) to study the BHCs' entry into the PI-MMF industry from first quarter 1988 to fourth quarter 1999. Although hazard models are more frequently used to model exit and survival, they have previously been used in the literature to model adoption (Saloner and Shepard, 1995; Kerr and Newell, 2003). In addition to reflecting the economic intuition of a duration model in which banks make entry

decisions each period, a duration model also allows us to estimate the entry decision as a function of time-varying characteristics that could plausibly affect a banks entry decision. The hazard model is specified as:

$$\lambda(t) = \lambda_0(t)\exp(\beta_1 CD_{it} + \beta_2 Size_{it} + \beta_3 Equity_{it} + \beta_4 3_MonTreasury_t) \quad (1)$$

In equation (1), $\lambda(t)$ is the hazard function of BHC entry determined by a set of covariates. $\lambda_0(t)$ is the baseline hazard corresponding to the value of the hazard if the covariates are zero, representing the underlying hazard of BHC entry over time without accounting for covariates. The main variable of interest, CD_{it} , is the bank i 's relative reliance on commercial deposits (normalized by BHC assets) in quarter t . $Size_{it}$ is the log of BHC's total assets and $Equity_{it}$ is the ratio of equity to total assets in quarter t . We also control for the interest rates measured by three-month Treasury rates.

Table 2 Panel A presents the results from the Cox proportional hazards model. In column (1), we use the full sample of all BHCs and find that larger BHCs and BHCs that had more commercial deposits are significantly more likely to enter the PI-MMF industry. However, commercial deposits can also serve as an indicator of the bank positioning itself as an acquisition target. Indeed, Akhigbe, Madura, and Whyte (2004) find that banks with a higher commercial deposit-to-assets ratio are more likely to be acquired. To control this possibility, we remove those banks that are acquired during our sample period.

Given the disparities between characteristics of entrants and non-entrants in Table 1, we use the non-parametric Coarsened Exact Matching (CEM) based on the pre-entry period average of BHCs' size and equity (Iacus, King, and Porro, 2012). The CEM methodology begins with the creation of a set of strata from the coarsened variables. These strata, acting as bins categorizing the covariates, span the full support of the joint distribution of the size and equity variables. Each

observation is subsequently assigned to a unique stratum according to its covariate values. For each observation of entrants, we selected the observation of non-entrants from the same stratum, effectively filtering out outliers that are distant from the size and equity ratio of the entering BHCs. CEM ensures a common support for all calculated measures and has also been shown to have better statistical properties than other matching methods such as propensity score matching (Iacus, King, and Porro, 2011, 2012).

Columns (2) and (3) present regression results from equation (1) on the non-acquired sample of banks, without and with CEM, respectively. In both cases, we find that a larger relative size of commercial deposits is significantly related to the BHCs' decision to enter the MMF business. The coefficient in column (3) indicates that a 1 percent increase in the commercial deposit ratio is associated with a 5 percent ($=\exp(4.662*0.01) - 1$) higher likelihood of entry. The result is consistent with the regulatory dialectic argument that banks that could be more affected by the regulatory restrictions, such as the interest rate prohibition of Regulation Q, are more likely to enter a less regulated substitute product and service, such as sponsoring a MMF that mimics the regulated activity.

In each of the specifications reported in Table 2, the three-month Treasury rate is not statistically related to the entry decision.¹¹ The absence of a relationship is surprising given the variation of Treasury rates over the time period, ranging from over 9 percent early in the sample period to 2.75 percent in late 1992, and rising and remaining around 5 percent for the remainder of the sample period. However, despite the variation over time, the difference between the zero rate imposed by Regulation Q and the three-year Treasury rate were still substantial (2.75 percent) even at their lows during the sample period.

¹¹ This is also the case when using changes in interest rates rather than levels.

An alternative way to model the hazard of BHC entry is the discrete-time hazard model proposed by Shumway (2001), which is essentially a pooled logit model. The Cox proportional hazard model above is modeling the (log) hazard rate, the rate of entry at a given time, interested in how long it takes for BHC to enter, using time-to-event data. In contrast, a pooled logit models the (log) odds ratio of BHC entry, without accounting for the within period time structure of exit. In Panel B of Table 2, we report the pooled logit results and observe that the results are qualitatively similar to those from the Cox model, suggesting that a higher commercial deposits ratio is associated with a higher probability of entry.

One limitation of the Cox model in our setting is that it only models the entry decision of BHCs and ignores the subsequent expansion behaviors of BHCs in the PI-MMF industry. To take both entry and expansion of BHCs into account, we employ a Poisson regression model on the full panel where the dependent variable is the number of funds sponsored by the BHC and the covariates and the sample period are the same as the Cox model above. The results from the Poisson regression model are presented in Table 3. The consistently positive coefficients suggest that larger BHCs and BHCs with higher levels of commercial deposits expand their presence in the PI-MMF industry and sponsor more PI-MMFs during our sample period. Holding the other covariates constant, a 5 percent (one standard deviation) increase in the commercial deposit ratio contributes to a 35 to 40 percent increase in the number of funds sponsored.

In contrast to Table 2, the equity to asset ratios in Table 3 are statistically significant in some specifications. We argue that this is reasonable as the expansion of funds relies upon investors perceiving more financial strength from a sponsor than is required from a sponsor upon entry, as expansion represents a more intense commitment from the fund sponsor.

5. Re-Regulation and Re-Circumvention

In the third stage of the regulatory dialectic, new regulations emerge as regulators and advocates for regulation realize the consequences of circumvention. Indeed, during the GFC, the government safety net was extended to protect certain “shadow banks” that had exposed the financial system to systemic risk (for instance, see the blanket guarantee of money market funds provided by the U.S. Treasury Department’s Temporary Guarantee Program for Money Market Funds). Consequently, in the aftermath of the GFC, regulators undertook major re-regulation actions in 2010, 2011, and 2016 to build resilience against systemic vulnerabilities and reduce the run-risk in the MMF industry. These re-regulation efforts reforms added new costs, especially on bank sponsors of MMFs and made MMF investors to share the default risk of the funds.

The 2010 and 2011 regulations that affected the MMF industry are the reforms associated with the Basel III agreements and the repeal of Regulation Q by the Dodd-Frank Act.¹² Basel III required banks to hold liquid assets against their contingent commitments—including sponsored PI-MMFs. Although implementation of Basel III through rulemaking did not occur coincident with the final version of the agreement, the final report was issued in June 2011, and earlier drafts informed expectations about future regulations. For example, Section B of the final report states that the rule ensures that banks have “sufficient high quality liquid resources to survive an acute stress scenario” and that they have sufficient resources “relative to the liquidity profiles of the assets, as well as the potential for contingent liquidity needs arising from off-balance sheet commitments.”¹³

¹² The final rule implementing this repeal was entirely effect on July 21, 2011. See <https://www.govinfo.gov/content/pkg/FR-2011-07-18/pdf/2011-17886.pdf>.

¹³ See <https://www.bis.org/publ/bcbs189.htm>.

Section 32 of the Liquidity Coverage Ratio (LCR) rule finalized in September 2014 to implement parts of the 2013 Basel III liquidity framework specifies that contractual commitments to sponsored funds such as MMFs must be backed one-for-one with high quality liquid assets.¹⁴ In contrast, commercial deposits required only a 25 percent backing with high quality liquid assets, assuming balances fall above the deposit insurance limit. Thus, under the new rules, having an MMF subsidiary brought new costs to the BHCs and changed the relative value between holding commercial deposits and MMF sponsorship.

About one month after the release of the final version of Basel III's global regulatory framework,¹⁵ the Federal Reserve issued a final rule repealing Regulation Q,¹⁶ thereby allowing interest payments on demand deposits. The final rule implemented the 2010 Dodd-Frank Act's repeal of the statutory prohibition against payment of interest on demand deposits set forth in Section 19(i) of the Federal Reserve Act. This regulatory change implied that banks were allowed to pay interest on commercial transaction deposit accounts for the first time in nearly 80 years, since the 1929 Glass-Steagall Act.¹⁷ As explained in Section 3, restrictions on interest payments caused the commercial deposit disintermediation during the early 1980s. As of July 21, 2011, member banks and federal savings associations were able to pay interest on demand-deposit accounts. This development was important because it reduced the attractiveness of PI-MMFs for institutional investors in the sense that they could now earn explicit market interest rates from bank deposit accounts while maintaining a higher degree of safety of their deposits provided by the financial safety net.

¹⁴ Section 32 refers to 12 CFR 50.32 for OCC-supervised institutions, 12 CFR 249.32 for Federal Reserve-supervised institutions, and 12 CFR 329.32 for FDIC-supervised institutions.

¹⁵ See <https://www.bis.org/publ/bcbs189.htm>.

¹⁶ See <https://www.govinfo.gov/content/pkg/FR-2011-07-18/pdf/2011-17886.pdf>.

¹⁷ The July 2011 change was a result of Section 627 of the Dodd-Frank Act, which removed the prohibition against interest payments on demand deposit accounts, also known as "the prohibition of interest on demand deposits." See Federal Register, Vol. 76, No. 135, page 41392.

Faced by a new set of re-regulatory actions, institutions were incentivized to re-circumvent these new rules by developing substitute products and services to mimic the PI-MMFs. The elimination of Regulation Q in 2011 opened a new way for BHCs to directly offer their institutional investors substitute products, such as interest-bearing deposits. Extensions and expansions of insurance of transaction accounts through the Dodd-Frank Act may have also helped BHCs to attract institutional investors.¹⁸ In addition, BHCs could promote government institutional MMFs as a substitute product from the same fund complex, which were not subject to Basel III requirements after 2011. In contrast, the nonbank-sponsored MMFs, which are not affected by the re-regulation actions during 2010–2016, are a reasonable control group for identifying the regulatory dialectic and we should see the substitution effect only in bank-sponsored funds.

Figure 2 displays the chronological order of significant events between September 2008 and October 2013. In addition, we display the dates pertaining to the SEC reforms of the MMF in 2016. We analyze the regulation dialectic from 2010 to 2016 period in two parts. First, we focus on 2010 to 2013 period, during which Dodd-Frank Act repealed Regulation Q¹⁹ and reforms associated with the Basel III agreements in 2010 were publicized, though many of the Basel III reforms were implemented between 2013 and 2019.²⁰ Our second analysis uses 2014 to 2016 during which SEC proposed and passed the 2016 money market reform. We analyze these regulatory changes in two sub-periods because the first set of regulations has an impact on bank sponsors whereas the second has an impact on both bank and nonbank sponsors.

¹⁸ The specific types and features of transaction accounts that were covered varied over time and across the TLGP and Dodd-Frank Act transaction account guarantee programs.

¹⁹ The final rule implementing this repeal was entirely effect on July 21, 2011. See <https://www.govinfo.gov/content/pkg/FR-2011-07-18/pdf/2011-17886.pdf>.

²⁰ See <https://www.bis.org/bcbs/history.htm>.

However, because the proposal and passage of these regulatory changes span 2010 to 2016, it is almost impossible to separate the effects of each regulatory change from each other in a clean way. Our approach to testing the re-circumvention hypothesis is twofold. First, we observe the general trends in the industry, and we assess whether these observations are held at the sponsor level. Second, we use nonbank sponsored MMFs as a control group and assess whether the bank sponsors behave in the direction of regulatory dialectic and differ from the behavior of the nonbank sponsored PI-MMFs.

a. Impact on the Number of Funds

Panel C of Figure 1 shows the trend of assets under management of the bank- and nonbank-sponsored PI-MMFs from 2010 to 2013.²¹ We observe that both types of funds had roughly the same amount of assets under management, around \$600 billion in 2010, and both types started declining before the passage of the Dodd-Frank Act in July 2010. Moreover, starting June 2011, both bank and nonbank PI-MMFs assets sharply declined. The decline stabilized by 2013, but bank-sponsored funds experienced a three-times-larger asset loss than nonbank-sponsored funds relative to asset levels in 2010. Nonbank-sponsored funds declined 10 percent, whereas bank-sponsored funds declined 28 percent.

However, in mid-2011, a “slow-motion run” hit the PI-MMF industry due to the fears about the European sovereign debt crisis, leading to over 170 billion redemptions in two months (Cipriani and La Spada, 2018). The concurrence of the slow-motion run and the regulatory changes

²¹ The timing of the announcement of the liquidity coverage ratio (LCR) in December 2010 in the Basel III framework, finalization of the framework in June 2011, and implementation of the LCR in the United States in October 2014 complicates the definition of the appropriate time horizon. Yankov (2020) demonstrates that the likely effects of LCR on affected banks’ HQLAs were largely realized by the time the U.S. issued the proposal for implementation of the LCR in October 2013, consistent with anticipation effects.

confounds the interpretation of the trends in Panel C of Figure 1. Thus, we test the hypothesis more rigorously on the difference in bank sponsors' and nonbank sponsors' behavior.

To analyze whether the differences in the observed trends between the bank- and nonbank-sponsored PI-MMFs are significant, we first test whether the bank-sponsored funds are more likely to exit the industry than the nonbank-sponsored funds after 2010. Figure 3 plots the exit of bank-sponsored and nonbank-sponsored PI-MMFs from 2010 to 2013. We construct the graph by plotting the number of exits in each quarter as a percent of existing number of funds at the beginning of each quarter. Consistent with the staggered nature of the announcement, passage, and implementation of new regulations fund exits for both banks and nonbanks are spread throughout the time period, and bank-sponsored fund exit rates generally exceed nonbank-sponsored fund exit rates during the time period.

To test more formally differences in exit rates between bank- and nonbank-sponsored funds, we model the exit decision as a Cox proportional hazards model, where sponsors choose each quarter whether a fund exits the PI-MMF industry conditional on survival until that quarter. The Cox model has the advantage over a cross-sectional probit model as it allows for time-variant covariates.

We create a binary variable, *Exit*, which equals one if the fund exited the MMF industry in that quarter between January 2010 and July 2013 and zero otherwise. The data consist of 115 PI-MMFs that existed in January 2010, of which 45 funds were bank-sponsored and 70 were nonbank-sponsored. At the end of the sample period, the number of nonbank-sponsored funds declined by 18.6 percent to 57, while the number of bank-sponsored funds dropped by 35.6 percent to 29. Similar to the entry decision, we model the exit decision as:

$$\lambda(t) = \lambda_0(t) \exp(\iota + \gamma Bank_{it} + Y' U_{it}) \quad (2)$$

The variable $Bank_{it}$ is an indicator of bank sponsorship for fund i at time t , and γ is our coefficient of interest. U_{it} is a vector of controls, and Y is a vector of coefficients. We control for the size of the prime institutional fund measured by the natural log of TNA ($\ln(\text{Fund TNA})$), and the performance of the fund portfolio measured by the average monthly annualized simple gross yield (Yield). We control for the riskiness of a fund portfolio by including the natural log of weighted average maturity ($\ln(\text{WAM})$) and holdings of risky assets as a percentage. Following Kacperczyk and Schnabl (2013), we define the risky assets as bank obligations, floating rate notes and commercial paper including asset-backed commercial paper.

We present the results of this analysis in Table 4. In all five specifications displayed in Table 4 Panel A, the coefficient on the bank sponsorship indicator is positive and highly significant, indicating that bank-sponsored funds have higher hazard of exiting the PI-MMF business than the nonbank-sponsored funds from 2010 to 2013.²² The coefficient in Column (5) indicates that having a bank sponsor is associated with 11 percent ($=\exp(2.477*1) - 1$) higher likelihood of exiting. In addition, we observe that small-size PI-MMFs are more likely to leave the industry, which increases the concentration of the industry around large-size funds. Interestingly, results show that the weighted average maturity of portfolio holdings, which we use as a proxy for portfolio risk, has a negative sign, indicating that high-risk-portfolio funds are less likely to exit the industry. In Panel B of Table 4 we report the results of the pooled logit model, which shows that the results are robust to an alternative specification.

We infer from the results that the re-regulatory efforts had a differential impact on fund closures during 2010 to 2013 for BHCs-sponsored PI-MMFs. Bank-sponsored funds closed operations at a higher rate than the nonbank-sponsored funds. This observation is consistent with predictions of

²² Columns (3)–(5) have a lower number of observations because WAM data is available for only a subset of funds.

regulatory dialectic that banks ceased activities (or redirected them) once they became more highly regulated.

b. Analyzing Fund Flows

Consistent with regulatory dialectic predictions, the elimination of interest rate restrictions on commercial deposits could have accelerated the flow of dollars from PI-MMFs and into substitute products belonging to the sponsoring BHC. However, equation (2) does not establish the link between the decline in PI-MMF fund assets and the flows into alternative products within the sponsor complex. BHCs can offer two possible substitute products: government institutional MMFs (GI-MMFs) within their sponsored fund complex and uninsured deposits within their bank subsidiaries.

Unfortunately, given data limitations, we cannot identify the flows from PI-MMFs to bank deposits. The repeal of Regulation Q induced secular inflows of deposits and thus the inflows from PI-MMF is diluted and difficult to isolate. In addition, The Temporary Liquidity Guarantee Program's unlimited insurance coverage to transaction accounts confounds the flow from PI-MMF to bank deposits. Therefore, in this section, we focus only on the flows from PI-MMFs to GI-MMFs.

Figure 4 shows the total net assets for bank sponsored and nonbank sponsored funds for PI-MMF and GI-MMF from 2010Q1 to 2013Q3, similar to the time period in Figure 3. We observe that prior to 2011, there does not appear to be aggregate substitution from PI-MMF into GI-MMF; the dashed lines (nonbanks) and solid lines (bank) commove. In contrast, during the shaded region of 2011, the trends for PI-MMF and GI-MMF deviate for both bank and nonbank sponsored funds; In particular, aggregate decreases in PI-MMFs beginning 2011 are offset by increases in aggregate

GI-MMFs for both sponsor types. Following the shaded period, beginning in 2012, aggregate PI-MMF and GI-MMF remain relatively flat.

To test whether the observed aggregate substitution between PI-MMF and GI-MMF in Figure 4 holds at the sponsor level, we estimate the following Equation 3 using panel data model for the sponsors during 2011. This is the year during which we observe aggregate substitution from PI-MMF to GI-MMF. There were 35 institutions that sponsored both PI-MMFs and GI-MMFs in 2011. Among the 35 sponsors, 16 are nonbank sponsors and the remaining are bank sponsors.

$$\Delta PrimeInstAsset_{it} = \beta_0 + \beta_1 \Delta GovtInstAsset_{it} + \beta_2 PrimeInstAssetRatio + \alpha_i + \gamma_t + \epsilon_{it} \quad (3)$$

In Equation 3, $\Delta PrimeInstAsset_{it}$ and $\Delta GovtInstAsset_{it}$ denote the rate of changes in quarter t for sponsor i for their collective prime institutional and government institutions funds, respectively. Sponsor fixed effects are denoted by α_i and time fixed effects are denoted by γ_t , which respectively capture time-invariant characteristics of sponsors and industry-wide shocks to assets growth. The ratio of prime institutional assets to complex assets is a proxy for the size of prime institutional holdings. The key variable of interest is the change in government institutional assets. We estimate Equation 3 separately for bank and nonbank sponsors.

We show the results in Table 5. Columns 1 and 2 correspond to the results from regressions using the full sample of both bank- and nonbank-sponsored funds, sample of nonbank-sponsored funds, and sample of bank-sponsored funds, respectively. In column 1, the regression using the full sample indicates that the assets flow from the PI-MMFs to GI-MMFs is not distinguishable from zero. The finding is consistent with the notion that 2011 regulatory changes did not target the operations of nonbank-sponsored funds. In a sharp contrast, however, we find from column 2 that

in bank-sponsored fund complexes, the growth of government institutional assets is significantly associated with a decline in prime institutional assets, supporting our central hypothesis. Column 3 reports that bank and nonbank sponsors are statistically different in their substitution from PI-MMFs to GI-MMFs during 2011, consistent with the difference between the parameter estimates in columns 1 and 2.

In sum, both the exit decision and the substitution results support the re-circumvention hypothesis. In contrast to non-bank sponsors, bank-sponsors reacted consistently with regulatory dialectic predictions and reduced activities in the regulated product and substituted these profitable activities with less regulated products.

c. Response to the 2016 Money Market Reform

In 2014 the SEC adopted a structural and operational reform to mitigate the run-risk in MMFs. Effective October 14, 2016, nongovernment PI-MMFs were no longer able to maintain a fixed net asset value (NAV), the redemption price of the shares. Instead, they would use a floating asset value, marking to market the value of their securities. These rules also provided the boards of nongovernment MMFs with new tools—liquidity fees and redemption gates—which shifted the run risk from the sponsor to the investors. Thus, the sponsors' safety net access provided a smaller external benefit to fund investors. However, government and retail MMFs were not subject to these new restrictions.

These new restrictions made prime institutional funds less attractive to investors relative to the pre-crisis period. Institutional investors in PI-MMFs bore additional risks of having their accounts unexpectedly frozen (potentially amid a more general financial crisis) or losing value due to fluctuations in NAV. However, one distinctive feature of these rules is that they were not bank or nonbank specific. All sponsors were affected in a similar fashion. Therefore, the 2014 SEC rules

act as a placebo test of re-circumvention hypothesis. We expect no difference in the exit behavior of bank and nonbank sponsors after the passage of the 2014 SEC rules.

Figure 5 plots the exit rates for bank and nonbank sponsors from 2014Q3 to 2016Q4. The figure shows that bank and nonbank sponsored PI-MMFs exit rates spiked in 2016Q3 to comparable levels as the rule took effect. The exit rates are consistent with the view that the reforms decreased the attractiveness of PI-MMFs similarly for bank and nonbank sponsors.

We conduct an analysis of sponsor exit following the MMF reform parallel to the hazard model used to model exit from 2010 to 2013. Table 6 shows the results. The sample in this hazard model starts from July 2014 when SEC finalized MMF reform and ends in December 2016, three months after the reform took effect. The results in all five columns suggest that in response to the MMF SEC reform, bank and nonbank sponsors do not exhibit a difference in their exit decisions.

6. Dialectic Continues

While the evolution of the PI-MMF market provides an illustrative historical example of the regulatory dialectic in action, Kane’s logic around the interplay between the financial industry and financial regulators continues to hold. More generally, demand for less regulated, but close substitute, financial products remains in the economy. For example, there are close structural similarities between the established MMF investment product and a relatively new creation: stablecoins (for instance, see Fed Chair Powell, 2021²³; Gorton and Zhang, 2022; and Anadu, et. al, 2023). Both products provide a money-like investment opportunity, designed to maintain a steady nominal value, while performing liquidity transformation (see Anadu, et. al, 2023). Both PI-MMFs and stablecoins are also demonstrably susceptible to runs (for instance, the runs on

²³ “Stablecoins are like money market funds [...], but they are, to some extent, outside the regulatory perimeter, and it is appropriate that they be regulated—*same activity, same regulation.*” [emphasis added]; Congressional testimony by Jerome Powell; Serial No. 117-50 (House Hearing) - Oversight of the Treasury Department's and Federal Reserve's Pandemic Response, September 2021 [2] Source: Investment Company Institution via Haver Analytics.

IRON in 2021, terraUSD in 2022, and USDC in 2023). As regulations and other reforms have reduced demand for PI-MMFs, stablecoins – a less-regulated, close substitute – have grown dramatically. Since the end of our analysis sample in 2016, the total assets held in PI-MMFs has been no larger than a few hundred billion, down from more than \$1.25 trillion at its peak.²⁴ Over the same time period, the assets in just the current top three largest stablecoins (Tether, USDC, and Dai) increased from less than \$10 million, to peak at close to \$150 billion in 2022.²⁵ Most recently, these two asset classes are of a similar magnitude. Of course, given the paucity of data, we make no conclusions, other than to state that these observations are consistent with a modern, active regulatory dialectic.

One final observation is the rapid withdrawal of money market fund shareholders during the initial stages of the COVID-19 pandemic, in March 2020 as part of a more general flight to perceived safety – the “dash for cash” (see Congressional Research Service (2022), and Anadu, Cipriani, Craver, and La Spada (2021) for detailed discussions). In relative terms, this run was similar in scale to the 2008 runs discussed above, with close to a 20 percent drop in total net assets held by prime funds. Moreover, as in 2008, the run was more severe in institutional funds. The regulatory response was familiar as well, with the Federal Reserve instituting the Money Market Fund Liquidity Facility by late-March, roughly coinciding with the return of stability to the market.

The 2020 runs on certain money market funds demonstrated that the post-2008 reforms were not sufficient to end the risk of runs, at least under the acute economic stresses caused by the outbreak of a historic pandemic. To address the fragilities exposed by the events of March 2020, the SEC amended the rules governing MMFs in 2023. These re-regulation actions had several

²⁴ Source: Investment Company Institution via Haver Analytics.

²⁵ Source: Coin Gecko via Haver Analytics.

effects (see SEC, 2023). They increased the liquidity requirements, removed the ability of MMFs to suspend redemptions, and required that institutional prime and tax-exempt MMFs impose a liquidity fee when they experience large redemptions (more than five percent of assets). While prime and tax-exempt institutional MMFs kept the floating NAV requirement, the amendments also allowed retail and government MMFS to convert from a stable to a floating share price. These changes in particular were explicitly designed “to improve the resilience [...] of money market funds” (SEC, 2023).

Although it is too early to evaluate empirically, the regulatory dialectic predicts that money funds affected by the rules will look to adjust their activities to mimic affected funds, but in a less regulated way.

7. Conclusion

Our findings provide an evidence-based explanation for the life cycle of bank-sponsored PI-MMFs that supports the regulatory dialectic of Kane (1977). Our findings show that bank-sponsored MMFs emerged in the early 1980s as a reaction to the restrictions on interest rates for bank commercial deposits. BHCs with more commercial deposits were more likely to enter the PI-MMF industry. By 2000, bank sponsors had accumulated roughly 50 percent of the MMF industry assets. Banks appeared to value MMF sponsorship because they kept commercial depositors in corporate-affiliated subsidiaries, extracted fee income from these funds, and avoided paying additional deposit insurance premiums or keeping higher liquidity buffers. Hence, MMFs provided a means to circumvent regulations for sponsoring BHCs.

However, after the 2008 crisis, the regulatory response reduced the comparative benefits of MMFs and bank sponsors closed their MMF business at a faster pace than the nonbank sponsors.

From January 2010 to July 2013, the number of nonbank-sponsored funds declined by 18.6 percent, while the number of bank-sponsored funds dropped by 35.6 percent. Our result shows that bank sponsorship is associated with a higher likelihood of sponsored PI-MMFs exiting the industry. Further, we find that in reaction to the regulatory changes, the industry shifted from PI-MMFs to substitute product GI-MMFs.

In other words, one circumvention efforts by banks gave rise to the institutional money market funds and another circumvention effort caused their demise. Collectively, our findings point to the existence of the regulatory dialectic. Banking organizations find ways to circumvent regulation by developing products or services that mimic the regulated products but are less regulated. When the regulators discover that the regulations cause unregulated alternatives, they re-regulate, and banks then react to the new set of regulations. In the case of PI-MMFs, it took about 30 years to discover that regulations set in early 1980s fueled the growth of shadow banks and created significant risks to the U.S. financial system.

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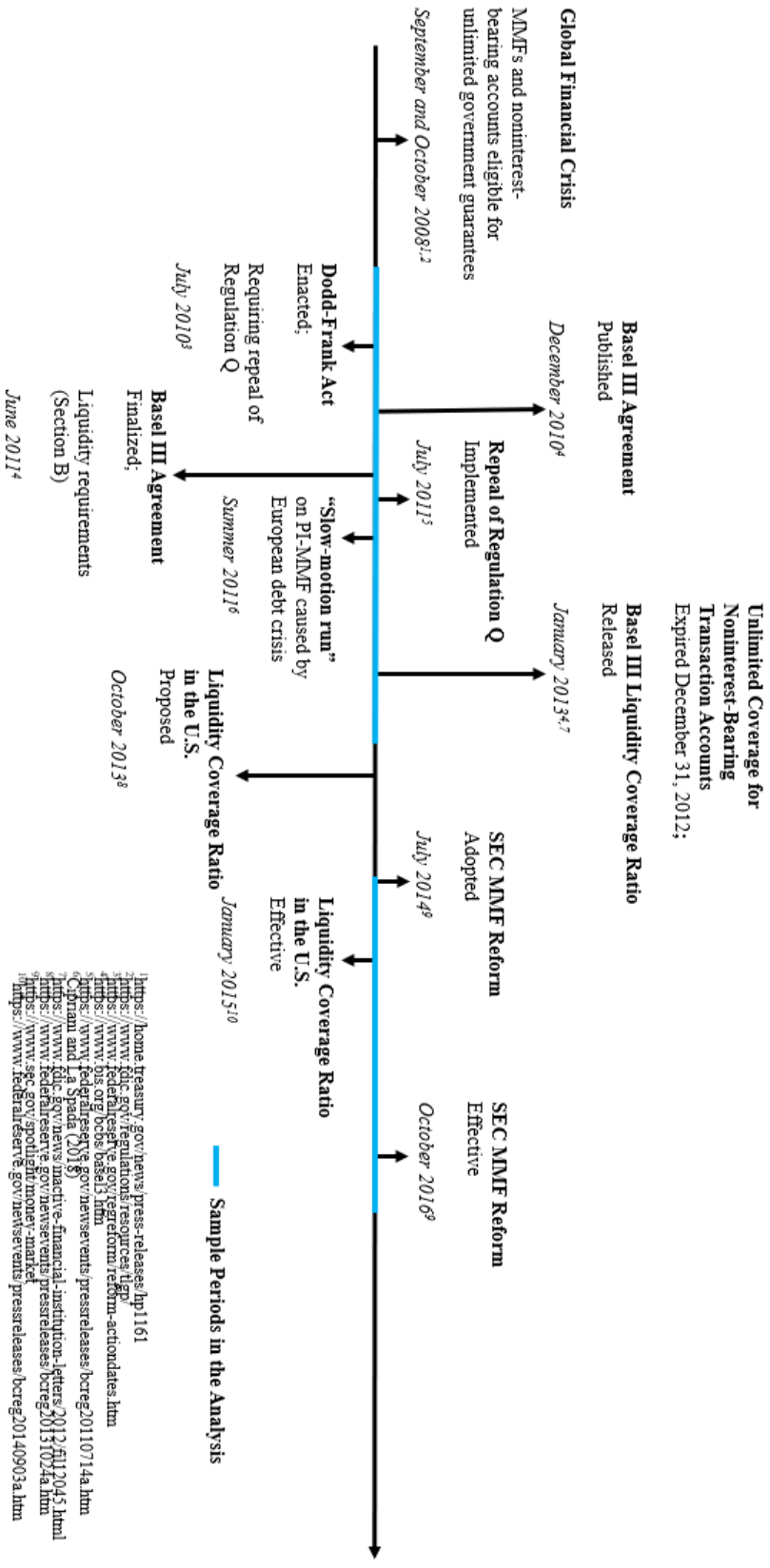
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Figure 1. Total Net Assets of PI-MMFs, January 1986 to December 2013. This figure shows the total net assets of prime institutional funds by sponsorship type from January 1988 to December 2013. The time period is separated to accentuate the relative dynamics over different periods. The top panel shows the total net assets of prime institutional funds by sponsorship type from January 1988 to 2000 in log scale. The middle panel shows the evolution from 2000 to 2010 in log scale. The last panel shows the relative decline of bank-sponsored funds from January 2010 to December 2013.

Figure 2. Chronological Order of Significant Events.



¹<https://home.treasury.gov/news/press-releases/lp1161>
²<https://www.fdic.gov/regulations/resources/lep/>
³<https://www.federalreserve.gov/retform/reform-actondates.htm>
⁴<https://www.federalreserve.gov/retform/reform-actondates.htm>
⁵<https://www.fedreserve.gov/retform/reform-actondates.htm>
⁶Ordman and La Spada (2011)
⁷https://www.fdic.gov/news/inactive_financial_institution_letters/2012/04/20120414.html
⁸<https://www.federalreserve.gov/newsevents/pressreleases/bcreg20131024a.htm>
⁹<https://www.sfc.gov/spotlight/money-market>
¹⁰<https://www.federalreserve.gov/newsevents/pressreleases/bcreg20140903a.htm>

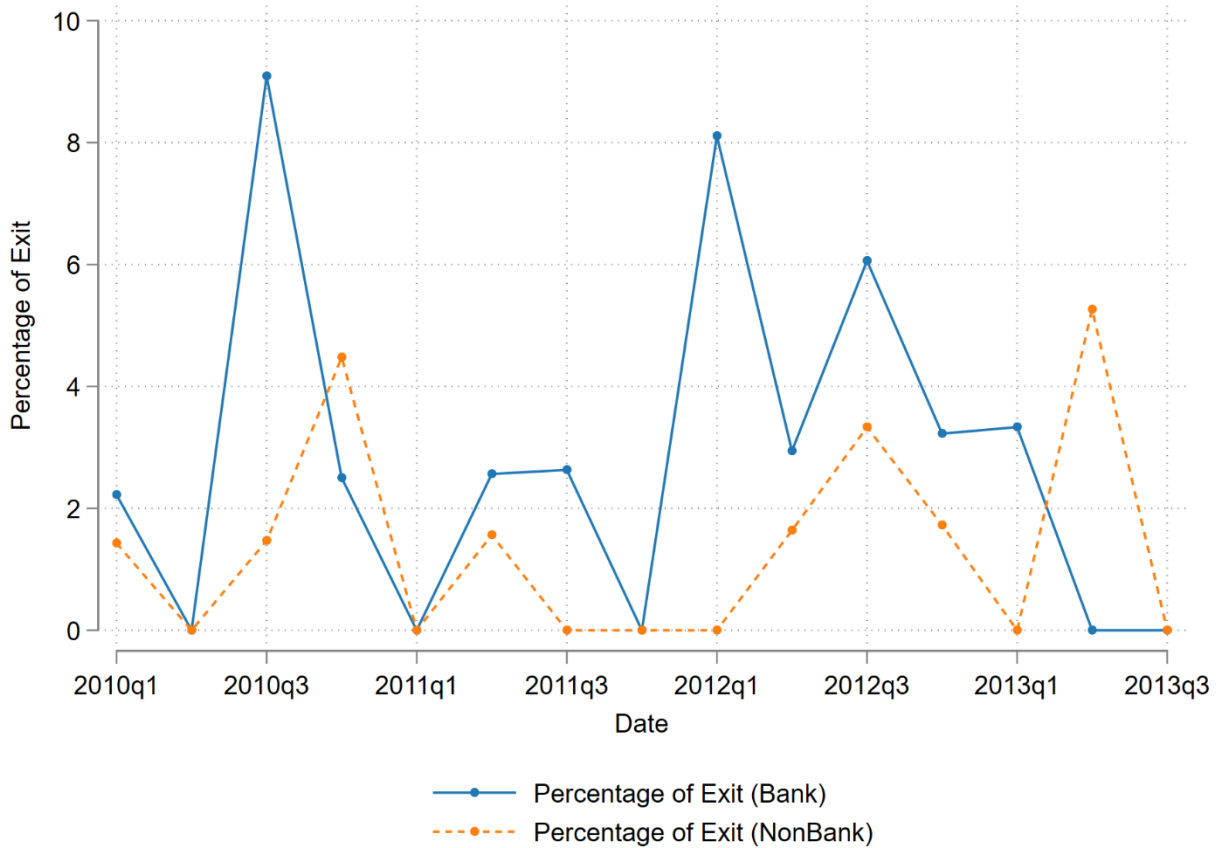


Figure 3. Percentage of Prime Institutional Money Market Funds Exiting, by Sponsor Type, 2010Q1 to 2013Q3. This figure shows the exit rate of bank-sponsored and nonbank-sponsored PI-MMFs from 2010 to 2013. The exit rate is calculated as the number of PI-MMF exits in each quarter as a percentage of the number of existing funds at the beginning of each quarter.

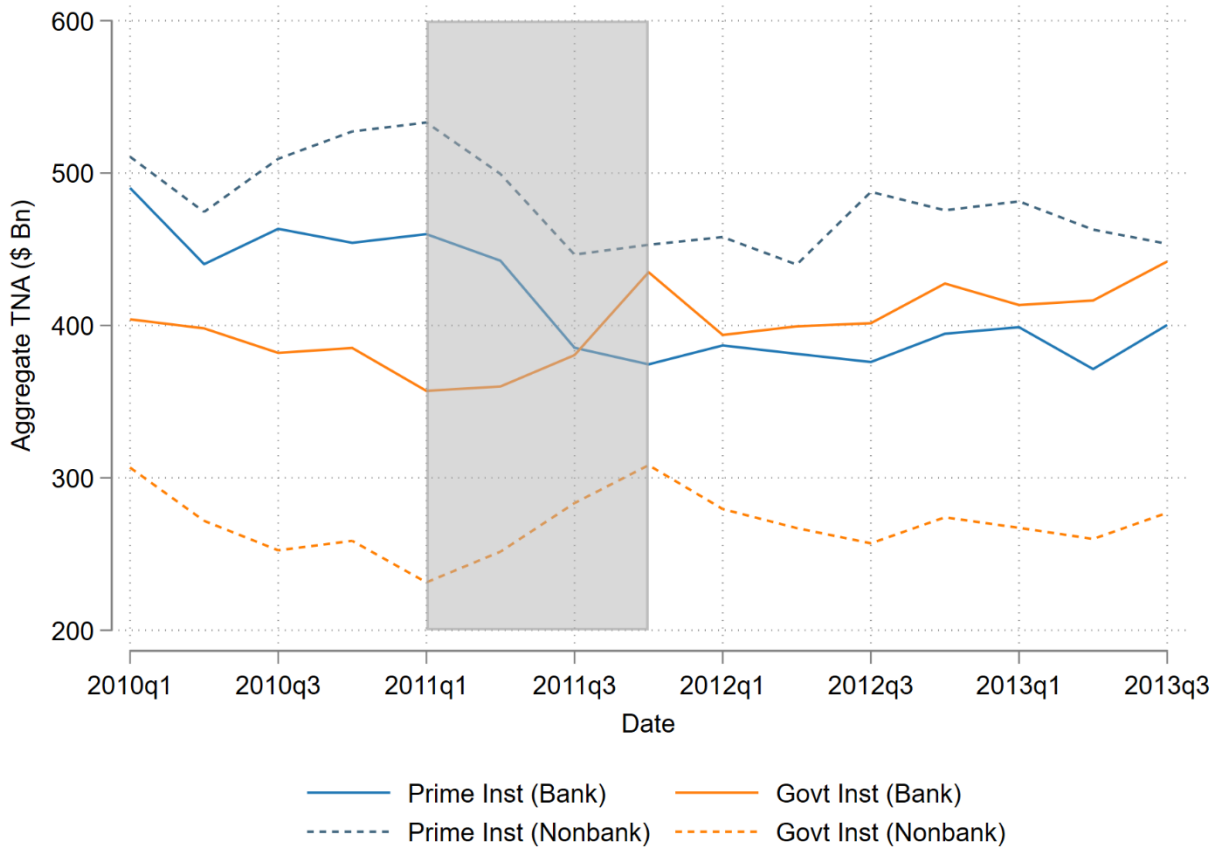


Figure 4. Aggregate Total Net Assets, 2010Q1 to 2013Q3. This figure shows the evolution of total net assets of prime and government institutional assets held by bank-sponsored and nonbank-sponsored funds from 2010 through the middle of 2013.

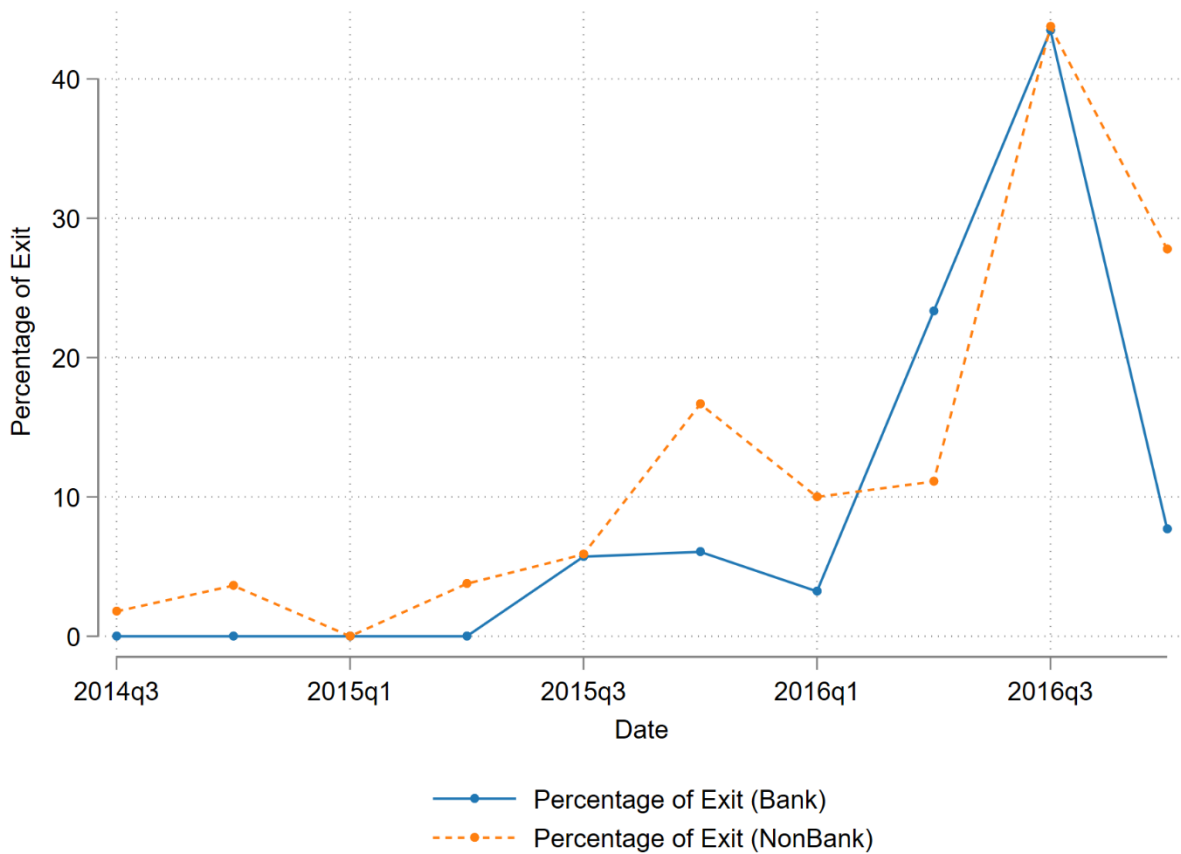


Figure 5. Percentage of Prime Institutional Money Market Funds Exiting, by Sponsor Type, 2014Q3 to 2016Q3. This figure shows the exit rate of bank-sponsored and nonbank-sponsored PI-MMFs from 2014 to 2016. The exit rate is calculated as the number of PI-MMF exits in each quarter as a percentage of the number of existing funds at the beginning of each quarter.

Table 1. Descriptive Statistics. This table presents the summary statistics of the key variables used in the samples for the circumvention and the re-circumvention periods of the bank-sponsored MMF. The standard deviations are in the parentheses below the mean.

Panel A: Circumvention period 1988 – 1999

	Sponsoring BHCs	Non-sponsoring BHCs	Difference
Comm. Dep./Assets	0.147 (0.046)	0.128 (0.062)	0.019***
Size (ln(BHC Assets))	16.748 (1.152)	13.302 (1.338)	3.446***
Equity/Assets	0.076 (0.016)	0.084 (0.033)	-0.008***
3-Mon Treasury Rate		5.401 (1.611)	
Number of BHCs	44	1,456	

*** p<0.01, ** p<0.05, * p<0.1

Panel B: Recircumvention period 2010-2016

	Bank-sponsored PI-MMFs	Nonbank-sponsored PI-MMFs	Diff
ln(Fund TNA)	9.082 (9.520)	8.779 (9.368)	0.303***
ln(WAM)	3.573 (2.536)	3.662 (2.587)	-0.089***
Yield	0.267 (0.113)	0.288 (0.114)	-0.021***
ABCP (%)	0.081 (0.085)	0.109 (0.105)	-0.028***
Commercial Paper (%)	0.310 (0.160)	0.326 (0.172)	-0.016***
Floating Rate Notes (%)	0.136 (0.113)	0.183 (0.163)	-0.047***
Bank Obligations (%)	0.208 (0.132)	0.243 (0.176)	-0.035***
Number of Funds	51	77	

*** p<0.01, ** p<0.05, * p<0.1

Table 2. Entry of Bank-Sponsored Funds into the PI-MMF Industry. Panel A presents the results from a Cox proportional hazards model of a BHC's entry into the PI-MMF industry as a function of banks' commercial deposit ratio and controls, from first quarter 1988 to fourth quarter 1999. Panel B reports the pooled logit results instead of the Cox model. Coarsened Exact Matching is used to build the sample used in Column 3. Robust z-statistics are in parentheses (clustered at the BHC level).

Panel A:

VARIABLES	Indicator of BHC Entry		
	All BHCs	Removing acquired BHCs	
	(1)	Full (2)	Matched (3)
Comm. Dep./Assets	4.267** (2.022)	5.020** (2.441)	4.662** (2.159)
Size	0.910*** (13.658)	0.880*** (11.605)	0.860*** (10.988)
Equity/Assets	1.505 (0.209)	-0.945 (-0.098)	-3.659 (-0.323)
3-Mon Treasury Rate	0.007 (0.058)	-0.132 (-0.764)	-0.077 (-0.457)
Observations	41,937	29,944	27,605
Wald Test	217***	159***	145.3***

*** p<0.01, ** p<0.05, * p<0.1

Panel B:

VARIABLES	Indicator of BHC Entry		
	All BHCs	Removing acquired BHCs	
	(1)	Full (2)	Matched (3)
CD/Assets	4.423** (2.152)	5.227** (2.560)	4.921** (2.363)
Size	0.938*** (14.174)	0.902*** (11.812)	0.884*** (11.394)
Equity/Assets	5.158* (1.870)	2.771 (0.425)	1.391 (0.153)
3-Mon Treasury Rate	0.007 (0.197)	-0.021 (-0.457)	-0.020 (-0.428)
Constant	-21.858*** (-17.302)	-21.175*** (-13.729)	-20.754*** (-12.217)
Observations	41,937	29,944	27,605
Pseudo R-square	0.2256	0.2244	0.2128

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Entry and Expansion of Bank-Sponsored Funds into the PI-MMF Industry. This table presents the results from a Poisson regression model of the number of funds sponsored by BHCs as a function of banks' commercial deposit ratio and controls, from first quarter 1988 to fourth quarter 1999. Robust z-statistics are in parentheses (clustered at the BHC level). Coarsened Exact Matching is used to build the sample used in Column 3.

VARIABLES	#Fund		
	All BHCs	Removing acquired BHCs	
	(1)	Full (2)	Matched (3)
Comm. Dep./Assets	5.89** (2.29)	6.91*** (2.60)	6.88*** (2.62)
Size	1.17*** (12.76)	1.16*** (12.56)	1.16*** (12.44)
Equity/Assets	7.90*** (4.55)	6.25* (1.70)	6.53 (1.43)
3-Mon Treasury Rate	-0.08* (-1.85)	-0.05 (-0.86)	-0.05 (-0.80)
Constant	-22.55*** (-12.85)	-22.28*** (-11.44)	-22.27*** (-11.21)
Observations	42,756	30,559	28,216

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Exit among Money Market Funds from 2010 to 2013. Panel A presents the results from a Cox proportional hazard model of fund closures between January 2010 and July 2013 as a function of PI-MMFs' bank sponsorship status. Panel B reports the pooled logit results. Robust z-statistics are in parentheses (clustered at the fund level).

Panel A:

VARIABLES	(1) Indicator of Fund Exit	(2) Indicator of Fund Exit	(3) Indicator of Fund Exit	(4) Indicator of Fund Exit	(5) Indicator of Fund Exit
Bank-sponsored	0.740** (1.996)	1.378*** (3.280)	1.755** (2.251)	1.738** (2.107)	2.477*** (2.795)
ln(Fund TNA)		-0.455*** (-5.208)	-0.248*** (-3.720)	-0.238*** (-3.520)	-0.281*** (-3.151)
ln(WAM)			-1.110*** (-4.860)	-1.082*** (-3.483)	-1.738*** (-4.766)
Yield				-0.974 (-0.223)	-3.338 (-0.572)
ABCP (%)					0.020 (0.741)
Commercial Paper (%)					0.051*** (2.637)
Floating Rate Notes (%)					-0.020 (-0.935)
Bank Obligations (%)					0.050*** (3.356)
Observations	4,245	4,245	2,871	2,871	2,871

*** p<0.01, ** p<0.05, * p<0.1

Panel B:

VARIABLES	(1) Indicator of Fund Exit	(2) Indicator of Fund Exit	(3) Indicator of Fund Exit	(4) Indicator of Fund Exit	(5) Indicator of Fund Exit
Bank-sponsored	0.740** (1.961)	1.416*** (3.174)	2.734*** (3.237)	2.783*** (3.350)	3.354*** (4.419)
ln(Fund TNA)		-0.460*** (-4.588)	-0.251** (-2.469)	-0.287*** (-3.151)	-0.324*** (-3.064)
ln(WAM)			-1.405*** (-4.620)	-1.467*** (-4.615)	-2.158*** (-5.776)
ABCP (%)					0.022 (0.921)
Commercial Paper (%)					0.049*** (3.143)
Floating Rate Notes (%)					0.007

Bank Obligations (%)					(0.293)
					0.053**
Yield				2.724	(2.029)
				(0.960)	(-1.219)
Constant	-5.320***	-2.721***	-0.432	-0.738	(-0.337)
	(-18.938)	(-4.600)	(-0.526)	(-0.772)	(-0.976)
Observations	4,245	4,245	2,871	2,871	2,871
Pseudo R-square	0.0113	0.0975	0.2933	0.2964	0.3642

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Substitution between PI-MMF and GI-MMF in 2011. This table presents results from estimating Equation 3 from the first to the last quarter of 2011. The outcome variable is the change in prime institutional assets at the sponsor level. Robust *t*-statistics are in parentheses (clustered at the sponsor level).

VARIABLES	Prime Inst Asset Change		
	(1) Nonbank	(2) Bank	(3) Nonbank/Bank
$\Delta(\text{Govt Assets})$	0.022 (1.052)	-0.164*** (-5.913)	0.017 (1.013)
Bank Dummy * $\Delta(\text{Govt Assets})$			-0.182*** (-3.848)
Prime Inst Asset Ratio (%)	0.016* (1.838)	0.016*** (3.443)	0.016** (2.397)
Constant	-0.664* (-1.827)	-0.587*** (-3.542)	-0.627** (-2.417)
Observations	62	74	136
R-squared	0.387	0.597	0.417
Sponsor FE	YES	YES	YES
Time FE	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Exit among Money Market Funds During 2014 to 16. This table presents the results from a Cox proportional hazard model that models fund closure between July 2014 and December 2016 as a function of PI-MMFs' bank sponsorship status. Robust z-statistics are in parentheses (clustered at the fund level).

VARIABLES	(1) Indicator of Fund Exit	(2) Indicator of Fund Exit	(3) Indicator of Fund Exit	(4) Indicator of Fund Exit	(5) Indicator of Fund Exit
Bank-sponsored	-0.268 (-1.047)	0.101 (0.418)	-0.163 (-0.543)	-0.376 (-1.197)	-0.499 (-1.481)
ln(Fund TNA)		-0.375*** (-6.565)	-0.348*** (-5.522)	-0.238*** (-2.751)	-0.242** (-2.524)
ln(WAM)			-0.250 (-1.570)	-0.031 (-0.187)	-0.105 (-0.702)
Yield				-7.157** (-2.568)	-2.906 (-0.922)
ABCP (%)					-0.031 (-1.114)
Commercial Paper (%)					-0.017 (-1.312)
Floating Rate Notes (%)					-0.025** (-2.022)
Bank Obligations (%)					-0.028* (-1.906)
Observations	2,177	2,177	1,384	1,384	1,384

*** p<0.01, ** p<0.05, * p<0.1