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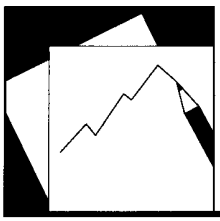
WP/11/190



# IMF Working Paper

# Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System

*Zoltan Pozsar*

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**IMF Working Paper**

Research Department

# Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System[1]

**Prepared by Zoltan Pozsar**

Authorized for distribution by Stijn Claessens

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## Abstract

Through the profiling of institutional cash pools, this paper explains the rise of the "shadow" banking system from a demand-side perspective. Explaining the rise of shadow banking from this angle paints a very different picture than the supply-side angle that views it as a story of banks' funding preferences and arbitrage. Institutional cash pools prefer to avoid too much unsecured exposure to banks even through insured deposits. Short-term government guaranteed securities are the next best choice, but their supply is insufficient. The shadow banking system arose to fill this vacuum. One way to manage the size of the shadow banking system is by adopting the supply management of Treasury bills as a macroprudential tool.

JEL Classification Numbers: E4; G2

Keywords: institutional cash pools; shadow banking; Treasury bills; money; macroprudential

Author's E-Mail Address: ZPozsar@imf.org

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## I. INTRODUCTION

This paper aims to answer the question why the bulk of institutional cash pools are not invested directly in deposits in the traditional banking system but in deposit alternatives and primarily in the so-called "shadow" banking system. It analyzes the portfolio allocation rationale of institutional cash pools with the aim to better understand the systemic risks inherent in their allocations presently.

To the best of the author's knowledge, this paper is the first to study the phenomenon of institutional cash pools and to ask why wholesale funding markets have grown, what the growing presence of institutional cash pools means for financial stability, and whether, in the context of the rise of institutional cash pools, the effectiveness of an official safety net for banks and deposits *only* has been eroding over time.

The paper builds on other analyses that link the recent financial crisis to demand for safe assets (see Acharya and Schnabl (2009), Caballero (2010), and Bernanke (2011)). According to these views, the financial crisis was driven by an insatiable demand from the rest of the world for safe, high-quality (that is, AAA) debt instruments, which the U.S. financial system produced through the securitization of lower-quality ones.

This paper adds two new dimensions to these views. First, it differentiates between demand for long-term AAA assets (the focus of the above papers) and short-term AAA assets (the focus of the present paper).

Second, it expands the discussion of the demand for AAA assets from foreign central banks' demand for long-term AAA assets, to U.S. domiciled, but globally active non-financial corporations' and U.S. domiciled institutional investors' demand for short-term AAA assets.

Throughout this paper, the demand for short-term AAA assets is referred to as the demand for insured deposit alternatives (see Gorton (2010), Stein (2010) and Krishnamurthy and Vissing-Jorgensen (2010)), and demand for them is explained by the secular rise of institutional cash pools.

In the context of the global savings glut, institutional cash pools' demand for short-term AAA assets can be viewed as the flipside of foreign central banks' demand for long-term AAA assets. In turn, cash pools' demand for short-term AAA assets is the principal source of marginal demand for maturity transformation in the financial system.

The paper has five conclusions. First, insured deposit alternatives dominate institutional cash pools' investment portfolios relative to deposits. The principal reason for this is not search for yield, but search for principal safety and liquidity.

Second, between 2003 and 2008, institutional cash pools' demand for insured deposit alternatives exceeded the outstanding amount of short-term government guaranteed instruments *not* held by foreign official investors by a cumulative of at least $1.5 trillion; the "shadow" banking system rose to fill this gap. From this perspective, the rise of "shadow" banking has an under-appreciated demand-side dimension to it.

Third, institutional cash pools' preferred habitat is not deposits, but insured deposit alternatives. This is to say that institutional cash pools' money demand is satisfied by non-M2 types of money. This is because institutional cash pools' money demand is not for transaction purposes, but for liquidity and collateral management as well as investing purposes, which aren't best met by deposits, but by Treasury bills and repos.

Fourth, the larger institutional cash pools and their demand for insured deposit alternatives grows relative to the supply of short-term government guaranteed instruments in the financial system, the less effective deposit insurance and lender of last resort access for banks *only* will be as stabilizing forces in times of crises.

Fifth, an elegant way to solve the financial system's fragility due to the rise of institutional cash pools and "shadow" banking would be to issue more Treasury bills and to explicitly incorporate the supply management of bills into the macroprudential tool kit. While not without costs or alternatives, this approach is less troublesome and complicated than the alternative of intense real-time monitoring and regulation of the shadow banking system.

The paper has six remaining sections. Section II measures the size of institutional cash pools in the non-financial corporate sector in the U.S. and globally, and among institutional investors in the U.S. Section III discusses the philosophy of how institutional cash pools attain security for their funds. Section IV discusses the portfolio allocation details of institutional cash pools and—in light of these details—highlights the gap between the accounting concept of cash equivalents and the scope of traditional monetary aggregates. Section V discusses the U.S. banking system's Triffin dilemma. Section VI provides policy recommendations and asks whether Basel III, higher deposit insurance limits and the repeal of Regulation Q will adequately deal with the secular rise of institutional cash pools and the systemic risks their safety preferences engender. Finally, Section VII concludes with offering an alternative, "non-arbitrage" explanation of the *raison d'etre* of the "shadow" banking system, and accordingly, proposes to rename it the **market-based** financial system.[2]

## II. WHAT ARE INSTITUTIONAL CASH POOLS?

The term institutional cash pool refers to large, centrally managed, short-term cash balances of global non-financial corporations and institutional investors such as asset managers, securities lenders and pension funds (see Pozsar (2011)). Institutional cash pools have become increasingly prominent since the 1990s, driven by three secular developments in the non-financial corporate and institutional investor landscapes:

[2]Also see Chapter 1 of the Bank of Canada's June 2011 Financial System Review: Emerging from the Shadows: Market-Based Financing in Canada.

First, the rise of globalization and the related rise of (i) large, global corporations and centrally managed corporate cash pools[3], and (ii) inequality, whereby an increasingly small core of the global population controls an increasingly large share of incomes and wealth.[4]

Second, the rise of asset management, and the related rise of (i) the centralized liquidity management of mutual funds, separate accounts and hedge funds within fund complexes, and (ii) securities lending, and the related rise of cash collateral reinvestment pools.

Third, the rise of derivatives-based investment styles—such as futures-based duration positioning, liability-driven investing and synthetic ETFs—which involve overlaying derivatives (such as futures and total return swaps) onto separately managed cash pools.

The common features of institutional cash pools are that they are large (typically at least $1 billion in size) and centrally managed. The central management of cash pools refers to the aggregation (or pooling) of cash balances from all subsidiaries worldwide in the case of global corporations, or all funds (including mutual and hedge funds and separate accounts) in the case of asset managers. Furthermore, the investment decisions that pertain to pooled balances are performed by a single decision maker (typically a treasurer) and through a fund that is a *single* legal person, but one that manages the cash balances of *many* legal persons.

Based on time series data available on (i) the cash holdings of S&P500 constituents, (ii) the holdings of liquid assets by all long-term mutual funds and (iii) the balances in securities lenders' cash collateral reinvestment accounts, the volume of institutional cash pools rose from $100 billion in 1990 to over $2.2 trillion at their peak in 2007; the volume of institutional cash pools stood at $1.9 trillion during the fourth quarter of 2010.[5]

These estimates are conservative, however, as due to data limitations, they do *not* include cash pools associated with (v) wealthy individuals; (vi) endowments; (vii) separate accounts, (viii) hedge funds, (ix) derivatives-based investment strategies, and (x) insurance companies and pension funds. Industry surveys and discussions with numerous market participants suggest that a conservative estimate of these additional types of cash pools would raise the 2007 and 2010 totals to $3.8 and $3.4 trillion, respectively (see Figure 1; for additional data see Appendix, Figures A1-A4).[6] Note that money funds are not included as institutional cash pools; institutional cash pools are investors in money funds but are *not* funds themselves.

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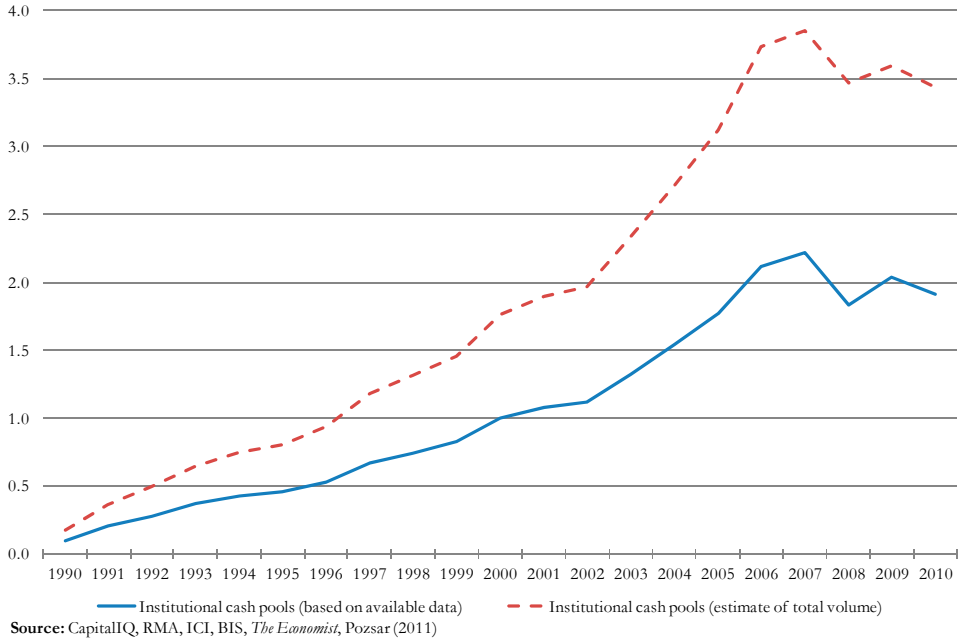
[3]Parallel to the globalization of corporations and the pooling of their globally earned cash balances, cash and cash equivalents as a share of corporate assets have also increased in recent decades (see Appendix, Figure A5 and Stulz, et al (1998) and Holmström and Tirole (2000)).

[4]Since the cash balances of high net worth individuals are typically managed out of family offices, the paper considers them as institutional cash pools.

[5]The data sources used to compile these estimates include CapitalIQ, ICI and RMA.

[6]The additional data sources used to compile these estimates include *The Economist*, Credit Suisse, BIS Working Papers No 343, and discussions with numerous market participants and asset managers. For the purposes of this paper, only privately-owned institutional cash pools are considered. Those of the foreign official sector, oil exporters and state and local governments in the U.S. are not.

**Figure 1:** The Secular Rise of Institutional Cash Pools
*$ trillions*




**Source:** CapitalIQ, RMA, ICI, BIS, *The Economist*, Pozsar (2011)

To understand the rationale behind the portfolio allocation of institutional cash pools, and why and how their secular rise in the financial ecosystem poses risks to financial stability, the paper next examines (i) the average size of institutional cash pools and their investment preferences, (ii) how the parameters of the official safety net cast around cash investors and (iii) the outstanding volume of short-term government guaranteed instruments have evolved relative to the aggregate volume of institutional cash pools over time.

## III. PROFILING INSTITUTIONAL CASH POOLS

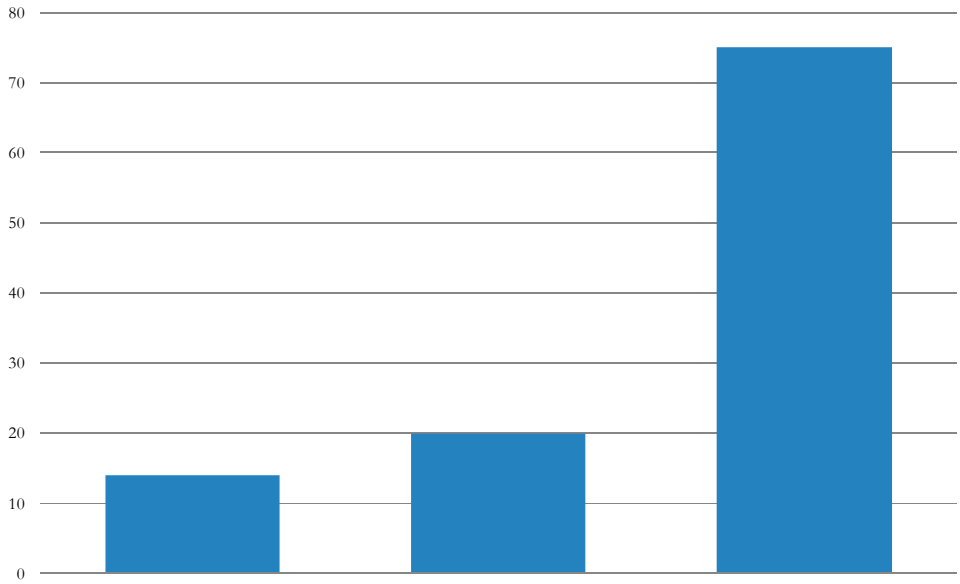
Institutional cash pools are large, with their sizes ranging from $1 billion to in some cases over $100 billion. For example, when the aggregate volume of institutional cash pools peaked in 2007, the cash pools associated with the most cash-rich corporations averaged $15 billion (see Appendix, Figures A6 and A7)[7]; the cash pools associated with long-term mutual funds averaged $20 billion per large asset manager; and cash collateral associated with securities lending programs averaged $75 billion per securities lender (see Figure 2).[8] With the increase in corporate liquidity and the consolidation of the asset management and

[7]The names of S&P500 constituents with the 20 largest cash pools in 2010 are provided in the left-hand panel of Figure 7A, while the right-hand panel provides a rolling (and anonymous) list of the top 20 pools over time. The color codes indicate the evolution of the size of corporate cash pools over time.

[8]These averages are rough estimates and were derived by dividing the 2007 aggregates by 20 in the case of long-term mutual funds' cash pools (to reflect the number of large asset managers in the U.S. at the time); and 22 in the case of securities lenders cash collateral pools (to reflect the actual number of securities lenders that regularly report their activities and which form the basis of deriving the aggregate volume of securities lending.

securities lending complexes since the financial crisis, the average size of associated institutional cash pools has likely grown further.[9] In addition, according to one estimate, the regulated migration of OTC derivatives to CCPs will add $200 billion to wholesale cash pools (see Singh (2011b)).

**Figure 2:** The Average Size of Institutional Cash Pools in 2007
*$ billions*




**Source:** CapitalIQ, RMA, ICI, Pozsar (2011)

The Association of Finance Professionals' annual Liquidity Surveys provide a wealth of information for understanding the investment preferences of the average institutional cash pool. The surveys provide an overview of the cash management policies and objectives of nearly 340 institutions covering non-financial corporations, financial institutions (such as securities lenders) and government organizations (such as the GSEs). Of this universe, this paper uses responses only from institutions with annual revenues of over $1 billion (43% of respondents), which are used to proxy the investment preferences of institutional cash pools.

According to these surveys, over 90% of institutional cash pools are subject to written cash investment policies, which govern the investment styles and fiduciary responsibilities of their managers. In order of priority, the objectives of these policies are: (i) safety of principal; (ii) liquidity; and (iii) yield (see Figure 3).

[9]See for example "BGI marks milestone for BlackRock", Financial Times, June 12, 2009 and the chart on the top five asset managers in "Asset management: Conga contemplation", Financial Times, May 2, 2011.

**Figure 3:** Institutional Cash Pools' Prioritized Investment Objectives

**Prioritized Order of Short-Term Investment Objectives**
*% of all institutions with cash investment policies (over 75% of institutions).*

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Safety | - | 67 | 80 | 86 | 74 | 80 |
| Liquidity | - | 17 | 18 | 14 | 25 | 16 |
| Yield | - | 16 | 2 | - | 1 | 4 |

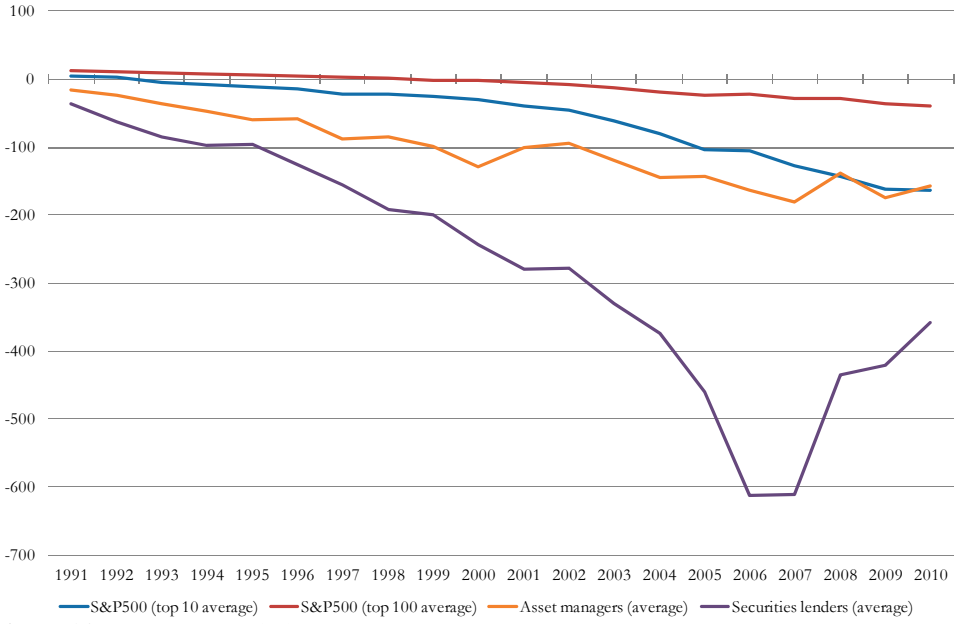
**Institutions with Cash Investment Policies**
*% of institutions with revenues of over $1 billion.*

| 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|
| 92 | 91 | 95 | 94 | 86 | 89 |

**Source:** Annual AFP Liquidity Surveys 2006-2011, Pozsar (2011)

Given their strong preferences for safety, institutional cash pools are not particularly well fit to be intermediated through the traditional, deposit-funded banking system. This is because there are not enough banks to spread the average institutional cash pool across in insured, $100,000 increments—the pre-crisis deposit insurance limit (see Figure 4). This problem has been present for asset managers, securities lenders and the ten most cash-rich S&P500 constituents since the early 1990s, and has become increasingly pressing for the one hundred most cash rich S&P500 constituents since 2000 as their cash balances kept on growing.

**Figure 4:** Not Enough Banks to Source Safety for Cash Pools
*# of additional banks needed to get safety through insured, $100,000 deposits, thousands*




**Source:** CapitalIQ, RMA, ICI, FDIC, Pozsar (2011)

Over time, the problem of the growing size of institutional cash pools was further complicated by (i) unchanged deposit insurance limits of $100,000 since 1980[10]; and (ii) the

[10]From A Brief History of Deposit Insurance: "There were three increases in the insurance coverage limit during the years 1942 to 1970. Coverage was raised from $5,000 to $10,000 in 1950, to $15,000 in 1966, and to $20,000 in 1969. (p45) […] In 1974, deposit insurance coverage was increased from $20,000 to $40,000, and to $100,000 for deposits held by states and political subdivisions. In 1980, despite the reservations of the FDIC, deposit insurance coverage for all accounts was increased to $100,000 by provisions of the Depository Institutions Deregulation and Monetary Control Act."

consolidation of the banking sector, which left institutional cash pools with fewer and fewer destinations in fixed, $100,000 increments, and hence, fewer and fewer options for counterparty diversification for purposes of cash investing in general. Between 1990 and 2010, the number of FDIC-insured banks shrank from 15,000 banks to 8,000, and, at the same time, the top ten banks' share of system assets trebled, from around 20% to 55% (see Appendix, Figures A8 and A9).

In reality, the deficit of the number of banks that institutional cash pools could be spread across is even bigger than what is shown in Figure 4, as (i) only the subset of banks that need funding at any given point in time are interested in cash pools' bids for deposits; (ii) corporate and institutional treasurers are bound by consolidated, notional, unsecured exposure limits (set by risk managers) to banks, taking into account all products and services (such as derivatives, hedges and credit lines) provided by any given bank; and (iii) tax and operational considerations—such as the central management of overseas cash balances from low-tax jurisdictions such as Ireland—that preclude cash balances from being repatriated and deposited with banks.

As the limits of slicing and spreading growing institutional cash pools in fixed, insured increments across a shrinking number of banks and against binding unsecured exposure limits were reached, institutional cash pools faced two alternatives: (i) holding uninsured deposits and becoming uninsured, unsecured creditors to banks, or (ii) investing in insured deposit alternatives—that is, safe, short-term and liquid instruments—such as short-term (ii/a) government guaranteed instruments or (ii/b) a range of privately guaranteed instruments (secured instruments and money funds) issued by the so-called "shadow" banking system.

With only a limited appetite for direct, unsecured exposures to banks through uninsured deposits, however, institutional cash pools opted for the second set of alternatives. Relative to the aggregate volume of institutional cash pools, however, there was an insufficient supply of short-term government-guaranteed instruments to serve as insured deposit alternatives. This shortage amounted to $1.1, $1.6 and $1.6 trillion in 2005, 2006 and 2007, respectively, and has been exacerbated by increasing foreign official holdings of short-term government guaranteed instruments since 2000 (see Figure 5).[11]

[11]Note that the actual deficit was even deeper, as the below exercise does not account for demand from (i) banks (to meet their regulatory requirements for liquid assets) and (ii) state and local government investment pools in the U.S. These sources of demand for short-term government guaranteed instruments are excluded due to data limitations. A detailed breakdown of the ownership of short and long-term government and agency securities by institutional owners' type is presently not available.

**Figure 5:** Not Enough Short-Term Government-Guaranteed Instruments to Source Safety for Institutional Cash Pools

**Sources of Institutional Demand for Treasury Bills and Agency Discos**
*$ billions*

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| **Outstanding Amounts:** | | | | | | |
| Short-term Treasury securities* | 1,146 | 1,173 | 1,192 | 1,909 | 2,558 | 2,487 |
| Short-term agency securities** | 568 | 489 | 560 | 903 | 844 | 618 |
| **Total** | **1,714** | **1,662** | **1,752** | **2,812** | **3,402** | **3,105** |
| **(-) Foreign Official Holdings:** | | | | | | |
| Short-term Treasury securities | 216 | 193 | 181 | 273 | 562 | na |
| Short-term agency securities | 112 | 110 | 80 | 130 | 34 | na |
| **Total** | **328** | **303** | **261** | **403** | **596** | **na** |
| **(-) Demand from Institutional Cash Pools:** | | | | | | |
| Institutional cash pools (based on available data) | 1,771 | 2,120 | 2,216 | 1,834 | 2,041 | 1,911 |
| Institutional cash pools (estimate of total volume) | 3,120 | 3,735 | 3,852 | 3,467 | 3,596 | 3,432 |
| **Average** | **2,445** | **2,927** | **3,034** | **2,650** | **2,818** | **2,672** |
| **= Deficit of safe, liquid, short-term products** | (1,059) | (1,568) | (1,543) | (241) | (12) | na |

*Includes Treasury bills and Treasury securities with a remaining maturity of one year or less; **includes agency discount notes.
**Sources:** TIC, SIFMA, CapitalIQ, RMA, ICI, BIS, Pozsar (2011))

With a shortage of short-term government-guaranteed instruments, institutional cash pools next gravitated—almost by default—toward the other alternative of privately guaranteed instruments, fueling the secular rise of the non-bank-to-bank subset of wholesale funding markets and the "shadow" banking system in general.[12]

From a bird's-eye view, institutional cash pools substituted for the vacuum of short-term government-guaranteed instruments and insured deposits (which are ultimately sovereign claims) through two alternatives. These were (i) the direct holdings of secured, privately insured money market instruments—such as repurchase agreements and asset-backed commercial paper—where collateral provided safety and substituted for government guarantees; and (ii) the indirect holdings of primarily unsecured (but also significant amounts of secured) private money market instruments through prime money funds, where funds' global portfolio diversification provided safety and substituted for government guarantees.

At a deeper level, both alternatives' safety was further enhanced by a combination of credit, liquidity and brand puts provided by deposit-funded banks and also bankruptcy exemptions. Both of these sources of enhancement served the purpose of perfecting institutional cash

[12]For the remainder of this paper, the terms "shadow" banking system and wholesale funding are used interchangeably (see Pozsar, et al (2010)).

pools' position in making sure that they get their funds back ahead of insured depositors (see Pozsar and Singh (2011, forthcoming) and Pozsar, et al (2010)). Institutional cash managers have dedicated analysts assigned to making sure that such enhancements are in the money at all times. If they are not, analysts would alert portfolio managers to divest the corresponding insured deposit alternatives or request the posting of additional collateral to strengthen them.

They key takeaway with regards to bankruptcy exemptions and puts as sources of safety enhancement should be that it were primarily deposit-funded banks that were providing them and were ultimately responsible for institutional cash pools' getting their cash balances back full and at par. In other words, deposit-funded banks functioned as institutional cash pools' **deposit insurers**. Apart from minor exceptions when this didn't happen, the provision of par puts cost banks their solvency and was a key propagator of the financial crisis of 2007-2008.

The above observation also offers an alternative explanation as to why cash pools had a preference to avoid too much direct, unsecured exposure to banks through deposits. Namely, in the context of privately issued deposit alternatives, the decision ultimately came down to investing either in (i) an unsecured instrument that funds opaque banks' extension of systemic risk insurance (that is, deposit insurance extended through credit and liquidity puts) to large volumes of money market instruments (such as asset-backed commercial paper), or (ii) investing in money market instruments that are secured, more transparent thank banks and that benefit from systemic risk insurance sold by banks. The second choice is optimal.

This rationale for institutional cash pools' aversion to bank deposits, together with the identification of the structural "deficit" of short-term government guaranteed instruments **refutes** the argument that the primary reason behind institutional cash pools' holdings of privately insured deposit alternatives was yield. It was not, as on one and three month tenors, these alternatives yielded less than negotiable CDs, and while they yielded more than short-term government guaranteed instruments, they were not held for yield reasons but because there was an insufficient supply of short-term government-guaranteed instruments. This shortage naturally pushed cash pools toward relatively high-yielding private alternatives to bills that were still low yielding relative to uninsured CDs (see Appendix, Figure A10).

## IV. CASH EQUIVALENTS AND MONETARY AGGREGATES

The similarity between short-term privately guaranteed and government guaranteed insured deposit alternatives is that they both represent solutions to institutional cash pools' preference for principal safety, and corresponding aims to (i) avoid too much direct, unsecured exposure to banks through uninsured deposits and (ii) invest cash at a distance from banks.[13]

[13]Central banks themselves are very much conscious of principal safety and counterparty diversification, and are active users of market-based banking. For example, the Bank of International Settlements manages nearly $250 billion in cash through various cash management products for central banks globally. Using interest rate and FX swaps, these products transform portfolios of long-term G7 government bonds into safe, short-term and liquid instruments that are "similar to certificates of deposit, priced at a margin below the OIS curve and liquidity enhanced by standby repurchases by the BIS". Central banks prefer to keep some of their cash with the BIS (and hence, at a distance from banks), since as lenders of last resort to banks, it is too risky to keep all their cash at banks (just as it is for institutional cash pools)! For more on these products, on Bloomberg type BIS <GO>.

These investment preferences are well documented in the portfolio allocation details of institutional cash pools based on data from the AFP Liquidity Surveys (see Figure 6):

**Figure 6:** Institutional Treasurers Never Put All Their Eggs in One Basket

**% Allocation of Short-Term Investments**
*Institutions with revenues of over $1 billion.*

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| **Outright Holdings** | | | | | | |
| *Traditional Bank Liabilities:* | | | | | | |
| Bank deposits | 16.9 | 16.8 | 16.4 | 27.7 | 31.5 | 33.3 |
| Eurodollar deposits | 2.7 | 5.3 | 8.9 | 3.7 | 4.1 | 3.5 |
| **Total** | **19.6** | **22.1** | **25.3** | **31.4** | **35.6** | **36.8** |
| *Government Obligations:* | | | | | | |
| Treasury bills | 3.2 | 1.4 | 8.9 | 8.9 | 9.0 | 5.9 |
| Agency securities | 3.1 | 1.7 | 4.1 | 2.3 | 4.1 | 2.6 |
| Municipal notes | 2.8 | - | - | 0.9 | 0.6 | 0.4 |
| **Total** | **9.1** | **3.1** | **13.0** | **12.1** | **13.7** | **8.9** |
| *Shadow Bank Liabilities:* | | | | | | |
| Repurchase agreements | 3.4 | 3.4 | 2.8 | 1.1 | 5.6 | 1.6 |
| Commercial paper[5] | 14.9 | 11.4 | 6.9 | 4.9 | 2.6 | 5.1 |
| Variable rate demand notes | 2.2 | 1.4 | - | - | 0.3 | 0.7 |
| Auction rate securities | 6.2 | 5.6 | 0.5 | - | 1.2 | 0.5 |
| Asset-backed securities | 2.1 | 1.0 | - | 0.9 | - | 1.1 |
| **Total** | **28.8** | **22.8** | **10.2** | **6.9** | **9.7** | **9.0** |
| **Intermediated Holdings** | | | | | | |
| *Regulated Intermediaries:* | | | | | | |
| Money market funds (MMFs) | 34.6 | 32.4 | 46.3 | 41.8 | 34.3 | 40.4 |
| 2(a)-7 Prime | - | - | - | 21.2 | 23.8 | 28.1 |
| 2(a)-7 Treasury | - | - | - | 20.6 | 10.5 | 12.3 |
| **Total** | **34.6** | **32.4** | **46.3** | **41.8** | **34.3** | **40.4** |
| *Unregulated Intermediaries:* | | | | | | |
| Cash "plus" funds | 0.3 | - | - | - | - | - |
| Enhanced cash funds | 0.7 | 2.7 | 1.9 | 2.3 | 1.7 | 1.1 |
| Ultra-short bond funds | 0.2 | - | - | - | - | - |
| Separate accounts | 3.9 | 4.2 | 2.1 | 3.1 | 2.0 | 1.9 |
| **Total** | **5.1** | **6.9** | **4.0** | **5.4** | **3.7** | **3.0** |
| **Aggregate Measures** | | | | | | |
| Deposits | 19.6 | 22.1 | 25.3 | 31.4 | 35.6 | 36.8 |
| Deposits "alternatives" | 72.5 | 58.3 | 69.5 | 60.8 | 57.7 | 58.3 |
| **Ratio** | **3.7** | **2.6** | **2.7** | **1.9** | **1.6** | **1.6** |

**Source:** Annual AFP Liquidity Surveys 2006-2011, Pozsar (2011)

During the 2006-2008 period (a survey period that excludes the failure of Lehman Brothers and the change in deposit insurance limits that followed) the average institutional cash pool held about 20% of its portfolio in bank deposits, which likely represent insured exposures to

the maximum possible extent through deposit brokers and aggregators[14] (see line highlighted with green borders in Figure 7); about 10% in short-term government guaranteed instruments (lines highlighted with blue borders); and about 60% in short-term, privately guaranteed instruments, which can further be split into 20% held in collateralized private money market instruments (lines highlighted with red borders) and nearly 40% in government-only and globally diversified prime money market mutual funds (lines highlighted with orange borders).[15]

Such institutional cash portfolios are commonly referred to in public financial statements as cash and cash equivalents. Cash is traditionally thought of as dollar bills and checking accounts, however, in the realm of institutional cash pools and money markets, the term "cash" refers to a broad range of safe, short-term and liquid instruments that are *perceived* to be cash (hence "equivalents") for all intents and purposes, and which accounting rules permit to be carried at amortized cost.

According to Statement of Financial Accounting Standards No. 95 (FAS95) issued in 1987, "cash equivalents are *short-term* [author's emphasis], highly liquid investments that are both: readily convertible to known amounts of cash and so near their maturity that they present insignificant risk of changes in value because of changes in interest rates. Examples of items commonly considered to be cash equivalents are Treasury bills, commercial paper, asset-backed commercial paper, repurchase agreements and money market mutual funds."

However, despite (i) the preferences of institutional cash pools to hold safe, short-term and liquid instruments as alternatives to insured deposits, and (ii) the accounting rules that apply to such instruments, they are *not* included in the official U.S. monetary aggregates. The Federal Reserve's M1 aggregate only includes instruments such as demand deposits and other checkable deposits, and its M2 aggregate includes savings deposits, small denomination time deposits (that is, time deposits in amounts of less than $100,000) and balances in retail-class money market mutual funds.

In the context of institutional cash pools' portfolio allocation details, there are at least two conceptual problems with the scope of U.S. monetary aggregates. First, if retail-class money funds are included, so should be other functional equivalents such as institutional-class money funds; securities lenders' cash collateral reinvestment pools; cash "plus", enhanced cash and offshore money funds, as well as ultra-short bond funds and the relatively recent innovation of money ETFs (as an alternative to money funds). Second, since the inclusion of retail-class money funds in M2 effectively amounts to an implicit inclusion in M2 of all the various types of money-market instruments that retail money funds invest in, the aggregate

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[14]One example of an aggregator is Promontory Interfinancial Network, LLC's Certificate of Deposit Account Registry Service (or CDARS).

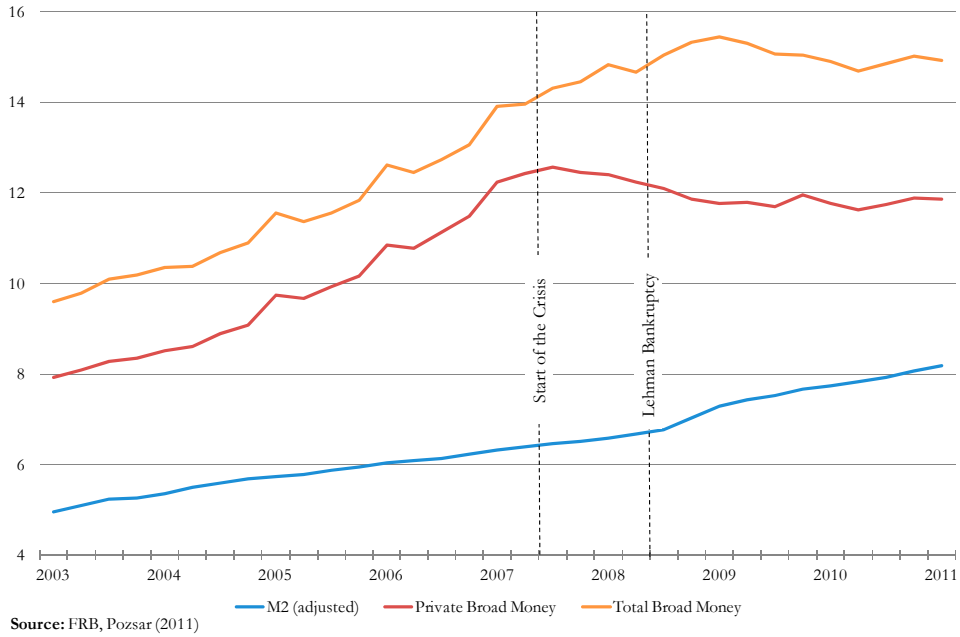
[15]Investments in cash intermediaries such as cash "plus" funds, enhanced cash funds, ultra-short-bond funds and separate accounts was a fourth distinct investment option. However, this option was not used to seek principal safety, but to enhance portfolio yield.

volume of all such types of money market instruments should ideally be included in M2 as well.

Including all these instruments in the official monetary aggregates would yield a total broad money aggregate of over $15 trillion and a private broad money aggregate of around $12 trillion just before the bankruptcy of Lehman Brothers, compared to the official M2 aggregate of $8 trillion at the time (see Figure 7 below).

To arrive at the broad money aggregates, the official M2 measure is adjusted to exclude retail-class money funds to eliminate double counting with the inclusion of all money-market instruments in broad money. Private broad money includes adjusted M2 plus large time deposits, financial commercial paper, asset-backed commercial paper, the money-market (A1) tranches of asset-backed securities, tender option bonds, variable rate demand obligations, auction rate securities and broker-dealer's net repos. Total broad money includes private broad money plus Treasury bills, Treasury notes with a remaining maturity of a year or less and agency discount notes. In other words, total broad money includes all safe, short-term and liquid instruments that (i) cash managers perceive as cash equivalents and trade them as such in money markets and (ii) accounting rules permit to be carried at amortized cost. For similar views on the ideal scope of broad money aggregates see Sweeney (2009), Stein (2010), Gorton (2010) and Krishnamurthy and Vissing-Jorgensen (2010).

**Figure 7:** Broad Money and Its Components
*$ trillion, stacked*




**Source:** FRB, Pozsar (2011)

The portfolio allocation of institutional cash pools suggests that the bulk of institutional cash managers' money demand is for "non-traditional", that is, non-M2 types of money. This is demonstrated in Figure 8 below, which shows the ratio of deposits to deposit alternatives for

the average institutional cash pool, securities lenders' cash collateral reinvestment accounts and the rest of the world's short-term dollar portfolios.[16] These data highlight a perception gap in the terminology that labels banks' non-M2 liabilities as non-core (see Shin (2011)), when such instruments are actually core holdings of institutional cash portfolios.[17]

**Figure 8:** The Preferred Habitat of Institutional Cash Pools is in Non-M2 Types of Money

**Institutional Cash Portfolio Allocations**
*% allocations*

| | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| **All Institutional Cash Pools** | | | | | |
| Deposits | 19.6 | 22.1 | 25.3 | 31.4 | 35.6 |
| Deposit "alternatives" | 72.5 | 58.3 | 69.5 | 60.8 | 57.7 |
| **Ratio** | **3.7** | **2.6** | **2.7** | **1.9** | **1.6** |
| **Securities Lenders' Cash Pools** | | | | | |
| Deposits | 13.9 | 14.7 | 11.1 | 9.3 | 15.1 |
| Deposit "alternatives" | 65.5 | 64.1 | 54.3 | 58.9 | 59.1 |
| **Ratio** | **4.7** | **4.4** | **4.9** | **6.3** | **3.9** |
| **Foreign Wholesale Cash Pools** | | | | | |
| Deposits | 6.8 | 5.0 | 6.8 | 3.3 | - |
| Deposit "alternatives" | 93.2 | 95.0 | 93.2 | 96.7 | - |
| **Ratio** | **13.7** | **19.0** | **13.7** | **29.3** | - |

**Source:** AFP, TIC, RMA, Pozsar (2011)

This also suggests that the preferred habitat of retail and institutional (or wholesale) cash investors are distinctly different along the broad money spectrum. Namely, retail cash investors (or depositors) keep their funds in insured, M2 instruments (checking, savings and time deposits, broadly speaking), whereas wholesale cash investors (or institutional cash pools) keep their funds in uninsured, non-M2 instruments that include a broad range of safe, short-term and liquid instruments.

Another factor that may explain the habitat discrepancy is retail and wholesale cash investors' different uses for money. Thus, whereas retail cash investors primarily use their cash balances for transaction purposes, wholesale cash investors primarily use their cash pools for liquidity and collateral management, as well as investing purposes. These purposes

[16]For the instruments in securities lenders' cash collateral portfolios and "the rest of the world's" short-term dollar portfolios see Appendix, Figures A11 and A12.

[17] Shin looks at the question of core/non-core instruments from the borrowers' (banks) perspective, while this paper looks at the question of core/non-core instruments from the investors' (funding providers') perspective.

aren't best met by deposits, but by non-M2 instruments such as Treasury bills, repurchase agreements and money market fund shares (also see Mehrling (2011)).

In turn, that the preferred habitat of institutional cash pools is in safe, short-term and liquid, but non-M2 types of instruments helps explain why so much maturity transformation (and by extension, credit intermediation) in the United States is being channeled outside the traditional, M2-funded banking system.

At any given point in time, the volume of maturity transformation conducted outside the traditional banking system is closely related to the shortage of short-term, government guaranteed instruments (such as Treasury bills and agency discount notes) relative to the volume of institutional cash pools.

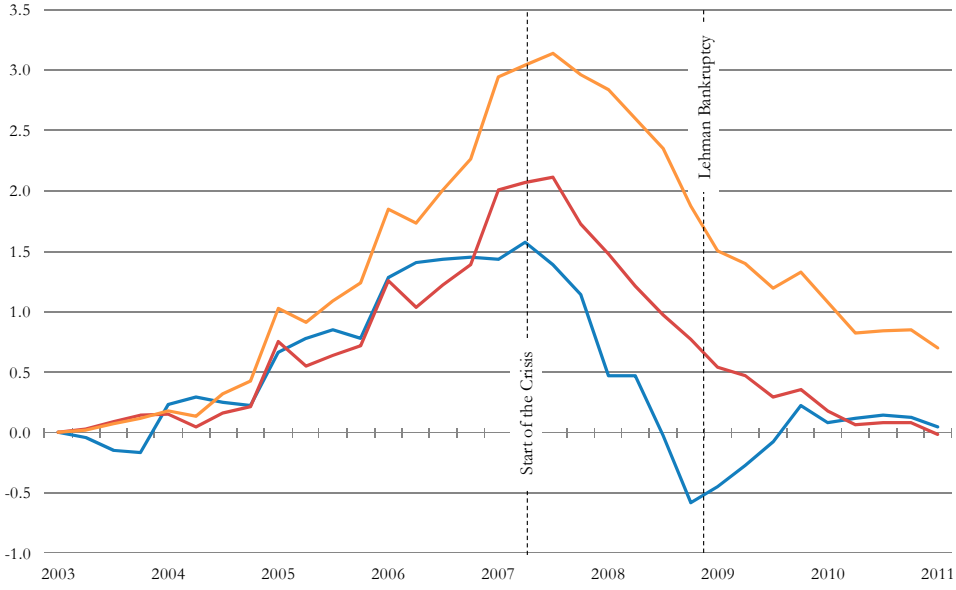
Given the structural shortage of short-term, government guaranteed instruments in the U.S. (see Figure 5 on page 7), and the non-M2 instrument preferences of institutional cash pools, shortages of short-term, government guaranteed instruments are not being filled with the issuance of deposits through the traditional banking system, but with the issuance of wholesale funding instruments by various types of entities in the "shadow" banking system. These entities include(d) broker-dealers, the GSEs' retained portfolios, conduits as well as limited purpose finance companies and SIVs pre-financial crisis (see Pozsar, et al (2010)).

In the years prior to the financial crisis, there was a close to 1:1 relationship between institutional cash pools' excess demand for short-term, government guaranteed instruments and the rise in wholesale funding instruments (all non-M2 by definition) issued by "shadow banks" to fill this demand gap (see Figure 9).[18] If anything, shortfalls in the 1:1 relationship during the pre-crisis period suggests that the structural deficit of short-term, government guaranteed instruments may be **understated** due to (i) a lack of data to account for banks' and local government investment pools' demand for such instruments (see Section III on page 7), or (ii) an **under-estimation** of the aggregate volume of institutional cash pools (the potential for under-estimation is acknowledged in see Section II on page 4).[19]

[18]The "Secured + Unsecured Funding" line in Figure 9 corresponds to the instruments that make up the difference between private broad money and adjusted M2 in Figure 7.

[19]The blue line in Figure 9 is calculated by subtracting from the total volume of short-term, government guaranteed securities (Treasury bills, Treasury notes with a remaining maturity of less than one year, and agency discount notes) the holdings of foreign official investors and the estimated volume of institutional cash pools; the resulting deficit figures are based to 2003Q1 and the cumulative gain in deficits since then are plotted with an opposite sign. The red and orange lines plot the cumulative incremental issuance volume of secured and unsecured wholesale funding instruments since 2003Q1. The relationship between the three lines breaks down after the crisis due to reasons that are outside the scope of this paper.

**Figure 9:** Filling the Vacuum of Short-Term Government Guranteed Debt
*Cumulative flows, 2003Q1=0.0, $ trillion*




**Source:** Pozsar (2011)

## V. THE TRIFFIN DILEMMA OF THE U.S. BANKING SYSTEM

The Triffin dilemma is often used to articulate the U.S. dollar's problems as the global reserve currency under the Bretton Woods system. Namely, as U.S. dollars became more and more widely used as the world's reserve currency in the 1960s, their volume in circulation grew to exceed the amount of gold actually backing them. This was unsustainable and the dilemma was "solved" by President Nixon taking the dollar off gold in 1971.

In the present context, Treasury bills (or more broadly, short-term government guaranteed instruments) are like gold. Just as in the 1960s there were too many dollars relative to U.S. gold reserves, today there is too much demand for safe, short-term and liquid instruments relative to the volume of (i) short-term, government guaranteed instruments; (ii) high-quality collateral to "manufacture" alternatives to short-term, government guaranteed instruments (see Bernanke (2011)); and (iii) capital to support the safety, short maturity and liquidity of such alternatives (see Acharya and Schnabl (2009)). All of these aspects have global dimensions:

First, one reason for the increase in the structural deficit of short-term, government guaranteed instruments is that reserve accumulation and foreign exchange management vis-à-vis the dollar is primarily conducted by foreign central banks through the accumulation of U.S. government guaranteed securities, including **short-term** government guaranteed securities. However, these instruments are also the first-resort investment choice of cash pools. As such, the "international monetary system's [ongoing slide] towards a massive dollar block" (see Carney (2010)) has implications for the portfolio composition of cash pools and banks' reliance on wholesale funding in general.

Second, the high-quality collateral requirements associated with the manufacturing of alternatives to short-term government guaranteed instruments is also influenced by foreign central banks' accumulation of **long-term** U.S. government guaranteed securities. For example, a shortage of Treasury bills can be filled by lending cash in a short-term repo transaction backed by longer-term Treasury notes. However, if the supply of high-quality term collateral becomes scarce, either (i) private alternatives (such as asset-backed securities and CDOs) will take their place (see Caballero (2009) and Bernanke (2011)), or (ii) the velocity of high-quality collateral will accelerate (see Singh (2011c, forthcoming)) if demand for the manufacturing of more safe, short-term and liquid instruments persists.

Third, the transformation of term private collateral into safe, short-term, liquid instruments requires the performance of credit, maturity and liquidity transformation, which were conducted across a highly diverse set of institutions in the "shadow" banking system and backstopped by a diverse set of banks globally. This explains the counterparty diversity, counterparty intensity and global scope of the "shadow" banking system as shown by the highly diverse set of entities plotted on its map (see Pozsar (2008) and Pozsar (2009)). In this context, the highly counterparty-intense nature of the "shadow" banking system could be rationalized as an "evolutionary" response to the counterparty diversification needs of ever larger institutional cash pools in a financial system with ever fewer large banks. This search for counterparty diversification occurred through various channels.

One such channel was the provision of more and more short-term funding to the GSEs and broker-dealers instead of banks.[20] Another channel was European banks increasing their market share in selling liquidity puts to dollar-funded asset-backed commercial paper conduits sponsored by banks and other entities in the United States.[21] And another channel was prime money market funds' gradual evolution over time into entities that intermediate vast amounts of dollar funding from institutional cash pools in the U.S. to banks in Europe, and thereby function as "portals" through which ever larger institutional cash pools could attain adequate levels of counterparty diversification across many banks globally that was becoming increasingly difficult (if not altogether impossible) to obtain with a shrinking number of large banks domestically in the United States.[22]

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[20]Note that the short-term funding of financial intermediaries is a function of both (i) the intermediaries' willingness to issue short-term instruments, as well as (ii) cash investors' preference to invest in short-term as opposed to long-term instruments. Without the overwhelming preference for safe, short-term and liquid instruments of institutional cash pools prior to the financial crisis (another way of saying that liquidity was abundant), it is unlikely that the GSEs and broker-dealers could have shortened their funding profiles to the extent they did (see Brunnermeier (2011)).

[21]According to Standard and Poor's of the 15 largest global liquidity providers to the ABCP market, 10 were European banks providing a total of nearly $450 billion in liquidity puts and 5 were U.S. banks providing a total of about $350 in liquidity puts as of March 31st, 2007. For institutional cash pools security through liquidity puts, the global diversification of put providers for secured instruments such as ABCP was just as important as the global diversification of unsecured exposures to banks' through money funds (see Footnote 22 below).

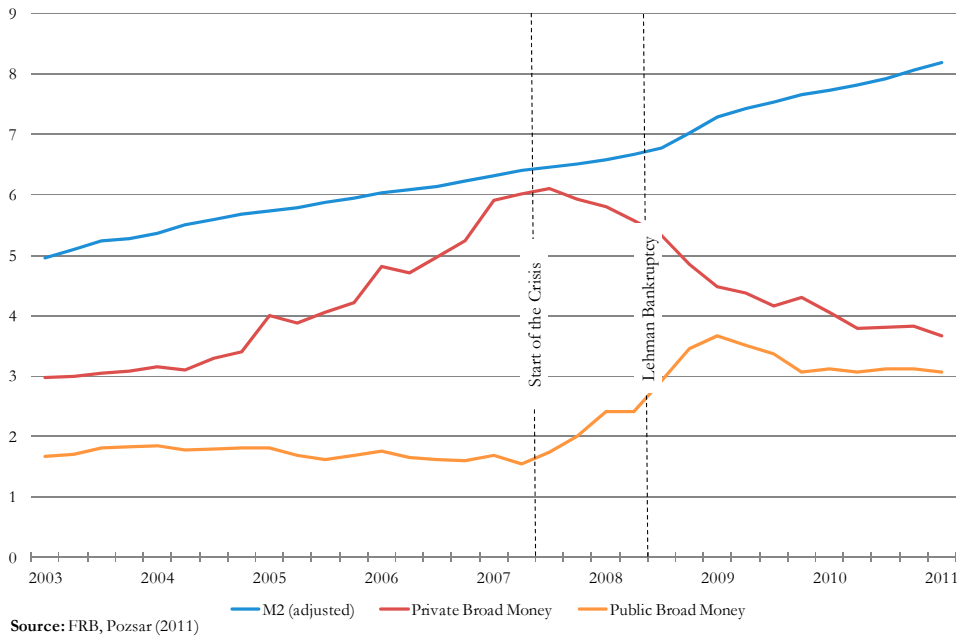
[22]Thus, while the genesis of money funds was in the arbitrage of Regulation Q, their evolution into a global diversification outlet isn't well recognized.

These examples demonstrate that not unlike the soaring volume of U.S. dollars relative to the volume of U.S. gold reserves stretched the convertibility of the dollar in the 1960s, the rise of institutional cash pools and their safety preferences stretched the U.S banking system to its limits in its ability to guarantee cash pools' principal safety and redeemability on demand and at par and in unlimited amounts and in all states of the world. The U.S. banking system failed at a task no less than endogenously creating private alternatives to Treasury bills, that had the same degree of safety and liquidity than the real T-bills that were in short supply.

This modern-day Triffin dilemma was ultimately solved in two-steps. The first step was the Federal Reserve taking over from banks the responsibility of making good on credit and liquidity puts extended to privately issued insured deposit alternatives through the creation of a series of 13(3) lending facilities (see Pozsar, et al (2010)). In retrospect, however, it should have been the Federal Reserve providing these puts from the outset, not the banking system. Note, that the same guarantees have been provided to retail cash balances by the official sector since the creation of the Federal Reserve and the FDIC in 1913 and 1933, respectively.

The second step was the subsequent ramp-up of the supply of short-term government guaranteed instruments by $2 trillion **to accommodate cash pools' trading out of private alternatives and into Treasury bills** as the crisis intensified and the supply of the latter 7instrument increased. In essence, the provision of funds through 13(3) facilities provided the funds to purchase newly minted, short-term government guaranteed paper. Also, in this sense, the "shadow" banking system did not shrink in a vacuum, but the instrument-void created by its shrinkage has been filled with the increased issuance of T-bills (see Figure 10).

**Figure 10:** Broad Money and Its Components
*$ trillion*

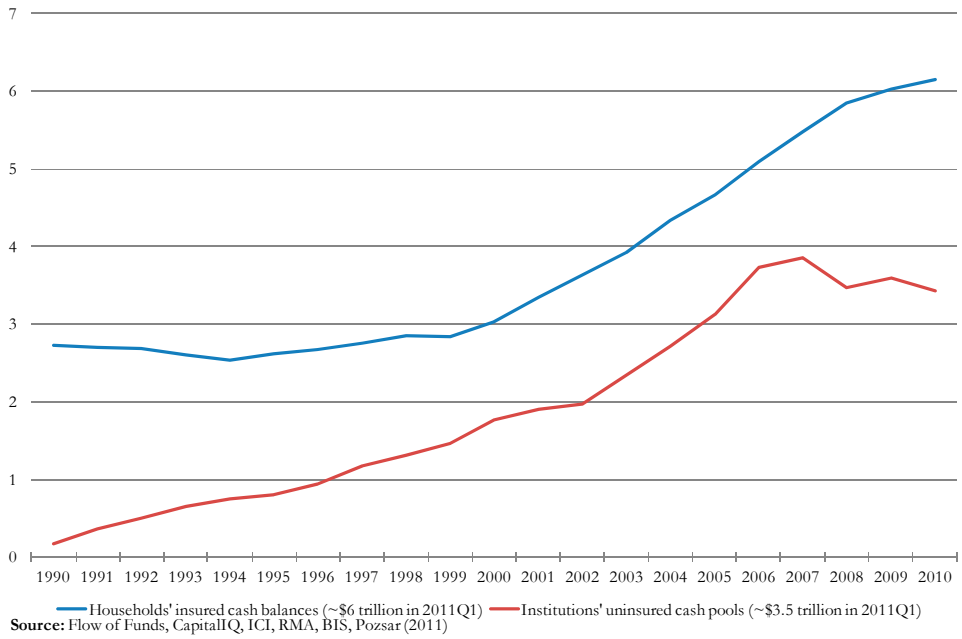



**Source:** FRB, Pozsar (2011)

The diagnosis that deposit-funded banks were the ultimate guarantors of institutional cash pools' principal balances is an important one given that the volume of uninsured institutional cash pools at $3.5 trillion is not far behind the volume of households' insured cash balances at $6 trillion (both as of the first quarter of 2011).

At just over 5%, uninsured institutional cash pools were a negligible fraction of insured deposits as recently as two decades ago (see Figure 11), but account for over 55% of insured deposits today. In light of these developments, it is legitimate to ask whether the secular rise of institutional cash pools relative to the volume of insured deposits in the U.S. financial system is making banks increasingly less able to backstop them.[23]

**Figure 11:** Has the Effectiveness of Deposit Insurance Been Eroded?
*$ trillions*




**Source:** Flow of Funds, CapitalIQ, ICI, RMA, BIS, Pozsar (2011)

Indeed, if institutional cash pools continue to rely on banks as their credit and liquidity put providers of last resort, the secular rise of uninsured institutional cash pools relative to the size of insured deposits is going to make the U.S. financial system increasingly run-prone, not unlike it used to be prior to the creation of the Federal Reserve and the FDIC (see Appendix, Figure A13).

Put another way, the secular rise of cash pools reduces the effectiveness of deposit insurance in promoting system-stability, if depository institutions are wired to serve as insurers of last

[23]The flipside of this question is whether too big to fail banks should be allowed to provide credit and liquidity puts to institutional cash pools through the privately issued insured deposit alternatives they sell them. The provision of these puts are tempting, as selling systemic risk insurance is what any large (that is too-big-to-fail) bank would "naturally" start doing once the market perceives it as too-big-to-fail.

resort for the **world's uninsured dollar liquidity**. By extension, it also weakens Diamond-Dybvig (1983) as an ex-post narrative for explaining the post-war quiet period in banking.

## VI. Policy Alternatives for Dealing With Institutional Cash Pools

Permanent solutions to the Triffin dilemma of the U.S. banking system requires policies that deal explicitly with institutional cash pools. These solutions include (i) the break-up of institutional cash pools; (ii) the matching of Treasury bill issuance to the volume of institutional cash pools; (iii) the expansion of lender of last resort access to non-banks (levered credit, maturity and liquidity transformers) that issue insured deposit alternatives; and (iv) the creation of a new class(es) of intermediaries that issue such deposit alternatives.

First, the break-up option of institutional cash pools is the least feasible alternative, as it would require "trust-busting" on unprecedented scales across various industries in the non-financial and financial sectors, globally, and at the cost of giving up efficiency gains that come from globalization and the central management of pooled cash balances in general.

Second, if the policy choice is to satiate institutional cash pools' demand for insured deposit alternatives with Treasury bills, the debt management office of the U.S. Treasury Department should consider the size and duration preferences of institutional cash pools. One should note, however, that this solution, while relatively straightforward, is not without costs as it would (i) shift rollover risks from the U.S. financial system to the U.S. Treasury Department; (ii) shift the focus away from optimizing the funding costs of the nation's debt to accommodating the portfolio preferences of institutional cash pools; and (iii) disengage a dominant source of short-term funding from credit intermediation to the real economy.

All that said, the synchronization of the issuance of U.S. Treasury bills to the aggregate volume of institutional cash pools could be a promising addition to the macroprudential toolkit in managing the size of the "shadow" banking system, and an operationally less cumbersome one than regulating and monitoring the shadow banking system.[24] Had there been more bills in circulation in the run-up to the crisis, it is likely that a greater share of subprime mortgages would have ended up not with *levered* money market accounts but instead with *unlevered* real money accounts, with less severe disruptions in a downturn.[25]

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[24] Issuing more Treasury bills would simply soak up the liquidity that institutional cash pools represent. It would reduce the "burden" of the banking system to soak up the same liquidity through the much more cumbersome process generating collateral and issuing levered, secured, short-term instruments against them.

[25] This argument is essentially the reverse of the so-called portfolio balance channel (see Bernanke (2010)). Thus, if the removal of duration via the purchases of Treasury notes currently incents market participants to substitute Treasury notes with long-term corporate bonds and equities, the removal of duration via the issuance of more Treasury bills would have resulted in duration-seeking market participants buying alternative assets such as private-label MBS and ABS CDOs. Had these assets been held in real money accounts, their implosion would have wreaked much less havoc in financial markets.

For a similar take on the greater need for bills issuance—although from a different angle—see Greenwood, Hanson and Stein (2010), who in their abstract conclude that "if there are negative externalities associated with private money creation, the government should tilt its issuance more towards short maturities. The idea is that the government may have a comparative advantage relative to the private sector in bearing refinancing risk, and hence should aim to partially crowd out the private sector's issuance of short-term debt."

Also note that the flipside of large-scale asset purchases (excess reserves) are an alternative to Treasury bills as safe, short-term, liquid assets—albeit a less optimal one from the perspective of institutional cash pools as they can only have **intermediated** exposures to reserves through **unsecured** exposures to banks; Treasury bills are directly held and **explicitly guaranteed** alternatives to holding reserves indirectly through deposits.

Third, if the aim is to involve institutional cash pools in credit intermediation to the private sector, recognizing the fact that institutional cash pools prefer to invest cash at a distance from banks and in secured, that is non-M2 types of instruments, implies the broadening of lender of last resort access to non-bank intermediaries that issue such instruments, such as broker-dealers (in the case of repo) and various types of maturity transformation vehicles that issued instruments such as asset-backed commercial paper, et cetera. The Federal Reserve's facilities created during the crisis were a step (albeit not a permanent step) in this direction (see Mehrling (2011), Grad, Mehrling and Neilson (2011), and Pozsar, et al (2010)).

Fourth, and finally, to the extent that the counterparty intensity of the―shadow banking system was an evolutionary response to institutional cash pools needs for counterparty diversification in a banking system that is dominated by a shrinking number of large banks, the creation of a series of intermediaries that fund in secured funding markets and serve as bridges between pools of long-term assets and the short-term cash balances of institutional cash pools merit consideration (see Gorton and Metrick (2010)). This is especially relevant given the run-off mode the GSEs (which served as such bridges) and the shrinkage of agency discount note supply it implies. The shrinkage of agency discos outstanding is another factor that's chipping away on institutional cash pools' preferred non-M2 habitat, which, unless countered by the issuance of more bills will likely lead to the increased issuance of new products such as collateralized commercial paper or putable CDs as alternatives.

None of these alternatives appear in the policy debate surrounding the reform of the banking system or regulating the "shadow" banking system, however. Instead, reform to date took the stance of (i) pushing banks away from short-term wholesale funding (that is, away from private, non-M2 instruments) and toward more stable deposit funding, but without asking the related question of whether there is more demand for deposits; (ii) adjusting deposit insurance amounts on the margin and repealing Regulation Q, under the assumption that the motivation of institutional cash pools' aversion to deposits and bills and preference for repos was yield; and (iii) mandating money funds to market their share as floating, as opposed to stable value instruments, but without considering what else will provide diversification for ever larger dollar-denominated cash pools away from an ever more concentrated U.S. banking system. Far from satisfying cash pools, these policies will likely frustrate them.

Of all reform efforts to date, the Dodd-Frank Act has influenced the portfolio allocation of institutional cash pools the most through (i) the temporary provision of unlimited insurance for noninterest-bearing transaction accounts (until December 31, 2012); (ii) the repeal of Section 19(i) of the Federal Reserve Act prohibiting the payment of interest on transaction accounts (otherwise known as Regulation Q) effective July 21, 2011; and (iii) the increase in the deposit insurance limit on interest-bearing accounts from $100,000 to $250,000.

According to the AFP surveys, the portfolio allocations of institutional cash pools to deposits have roughly doubled between June 2008 and June 2011, from 16% to 33% (see Figure 6). This has been driven by the 150% increase in the FDIC's maximum insurance amount from $100,000 to $250,000, and the *temporary* provision of unlimited insurance on noninterest-bearing transaction accounts.

However, these allocations to deposits are unlikely to increase much further from here, even when the repeal of Regulation Q goes into effect on July 21st, 2011. According to a special question in the June 2011 survey, 45% of institutional cash pools "have no plans to increase their balances held at their U.S. relationship banks as a result of the repeal of Regulation Q or unlimited insurance on transaction accounts though of 2012."

Several safety considerations could explain why:

First, noninterest-bearing transaction accounts that are fully insured up through December 31st, 2012 still represent direct, unsecured exposures, and uncertainty as to how soon after a bank's bankruptcy one's balances could be recovered. Treasury bills and secured instruments such as repurchase agreements (or repos) being safer (and also interest bearing[26]) alternatives, with the latter offering more immediate (almost instantaneous) and certain (collateral quality dependent) recoveries than insured deposits.[27]

Second, for interest-bearing transaction accounts, unlimited insurance will not apply, but only the new, standard maximum deposit insurance amount of $250,000. Given the average size of institutional cash pools and the number of FDIC-insured banks, even the higher insurance limits aren't an efficient way for cash pools to attain safety. Here too, Treasury bills and repos will continue to represent safer alternatives.[28]

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[26] Substituting noninterest bearing checking accounts with interest bearing Treasury bills or repo should not be considered as search for yield. First, for example Krishnamurthy and Vissing-Jorgensen (2010) argue that Treasury bills are just as safe and liquid as checking accounts, with the added benefit that they earn interest. Second, when managing billions of dollars in cash, one is more like a funding provider, rather than a depositor. On very large balances, fiduciary responsibilities necessitate earning some return, even on an overnight basis.

[27] An example of sophisticated cash investors' relentless effort of securing certainty to get their principal back instantaneously is provided by the fact that not all cash managers invested in TLGP debt. Although FDIC insured (and hence backed by the sovereign), such claims were deemed subordinated in credit seniority to U.S. Treasuries as it was unclear when payment on them would be made in case of bankruptcy.

[28] Several institutional cash pool managers highlighted this point as it would raise the risk of their own bankruptcies. Additional concerns raised by the managers of institutional cash pools were whether cash balances that amount to tens of billions would really rank pari passu with the balances of main street if the

(continued…)

Third, for interest-bearing non-transaction accounts (that is, for non-overnight institutional cash balances), similar to interest-bearing transaction accounts, even the higher, $250,000 deposit insurance limits do not appear to be sufficient to attain full safety for institutional cash pools through insured deposits (see Appendix, Figure A14). Provided that a shortage of short-term, government guaranteed instruments exists, future leakage of funding into the "shadow" banking system is most likely to come from this maturity spectrum.

## VII. CONCLUSIONS

Through the profiling of the size and investment preferences of institutional cash pools, this paper explained the rise of the "shadow" banking system from a demand-side perspective. Explaining the rise of "shadow" banking from this perspective paints a very different picture than the supply-side angle that views "shadow" banking as a story of banks' funding preferences and arbitrage. The conclusion of the paper is that institutional cash pools prioritize principal safety and portfolio diversification over yield and are hesitant (in many cases due to fiduciary reasons) to take on too much direct, unsecured exposures to banks through even insured deposits. In other words, institutional cash pools are not particularly keen on being intermediated through the traditional banking system.

Between 2003 and 2008, institutional cash pools' cumulative demand for short-term government guaranteed instruments (as alternatives to insured deposits) exceeded the supply of such instruments by at least $1.5 trillion. The "shadow" banking system rose to fill this vacuum, through the creation of safe, short-term and liquid instruments. Thus, from this perspective the "shadow" banking system was just as much about networks of banks, investment banks and asset managers working together to respond to institutional cash pools's preference to invest cash at a distance from banks as it was about banks' funding preferences and off-balance sheet banking. From this perspective, the rise of "shadow" banking has an under-appreciated demand-side dimension to it.

In turn, if the development of the "shadow" banking system was an evolutionary response to the safety and counterparty diversification preferences of wholesale cash pools and a structural deficit of short-term government guaranteed instruments, there are indeed some strong macro reasons for why the "shadow" banking system exists. In other words, what looks like undesirable regulatory arbitrage from the perspective of regulated institutions, was desired portfolio diversification from the perspective of institutional cash pools. This is to say that if regulatory arbitrage inspired the pejoratively-sounding term **shadow banking**, cash portfolio diversification could imply renaming it to **market-based** banking.

Central banks themselves are very much conscious of principal safety and counterparty diversification, and are active users of market-based banking solutions. The Bank of International Settlements manages nearly $250 billion in cash through various cash

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payout of billions in balances would force the FDIC to impose uncomfortably large haircuts on small depositors.

management products for central banks globally. Using interest rate and FX swaps, these products transform portfolios of long-term G7 government bonds into safe, short-term and liquid instruments that are "similar to certificates of deposit, priced at a margin below the OIS curve and liquidity enhanced by standby repurchases by the BIS". Central banks prefer to keep some of their cash with the BIS (ergo, at a distance from banks), since as lenders of last resort to banks, it is too risky to keep all their cash at banks (just as it is for cash pools)![29]

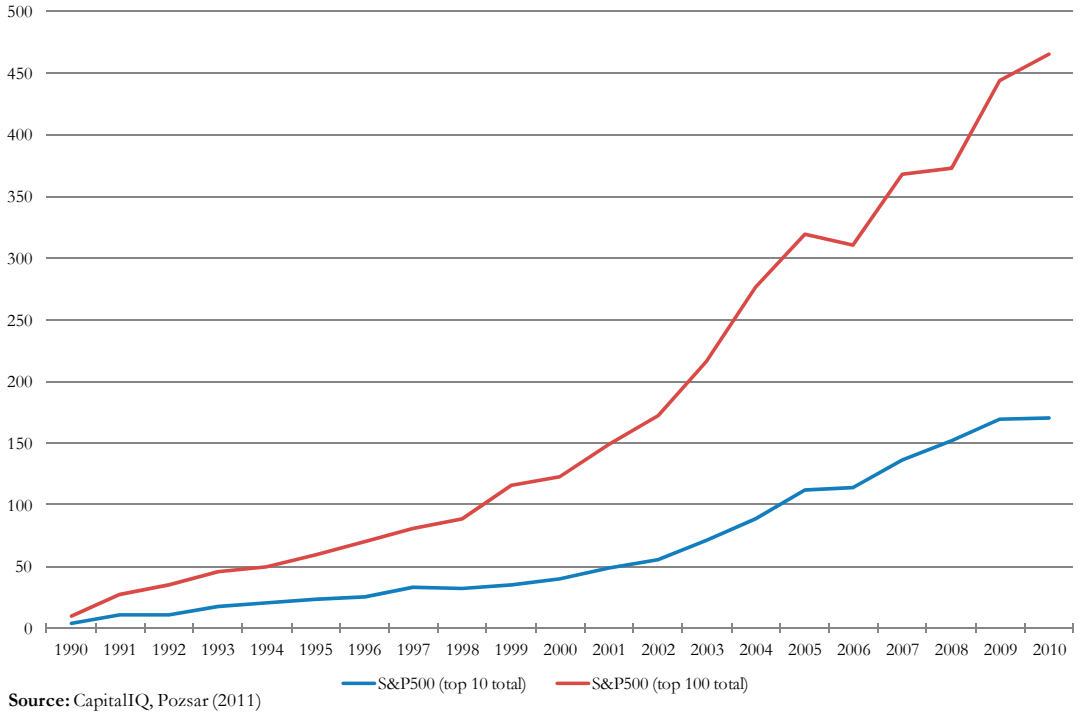
Against this backdrop, the questions that regulators should be asking are: (i) whether to incorporate the issuance of short-term government guaranteed instruments in the macro-prudential toolkit and aim to fully meet institutional cash pools' demand for such instruments; and (ii) how, as an alternative, institutional cash pools could be involved in credit intermediation to the real economy through a market-based credit system and how this system—and the insured deposit alternatives it generates as a byproduct of its credit intermediation activities—should be embraced by central banks (see Mehrling (2010)).

Institutional cash pools strong safety preferences were the principal drivers of the emergence of the market-based financial system. These preferences are either satisfied through policy or through solutions devised by the financial system. Frustrating the system's ability to provide these solutions while at the same time not addressing the vacuum this creates through policy remain fundamental sources of systemic risk and point to more frequent banking crises ahead

[29]For more on these deposit alternatives see page 164 of the 81st BIS Annual Report.

## APPENDIX

**Figure A1:** Non-Financial Corporations' Cash and Cash Equivalents Holding
*totals, $ billions*

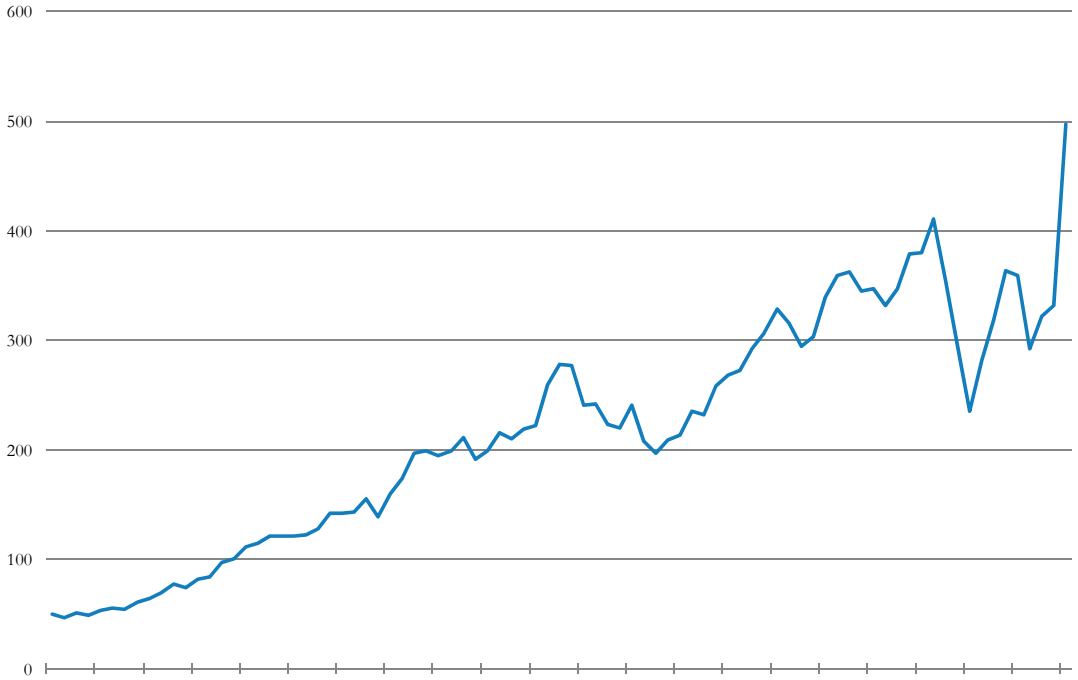



**Source:** CapitalIQ, Pozsar (2011)

**Figure A2:** High Net-Worth Individuals
*Number of $ billionaires worldwide*

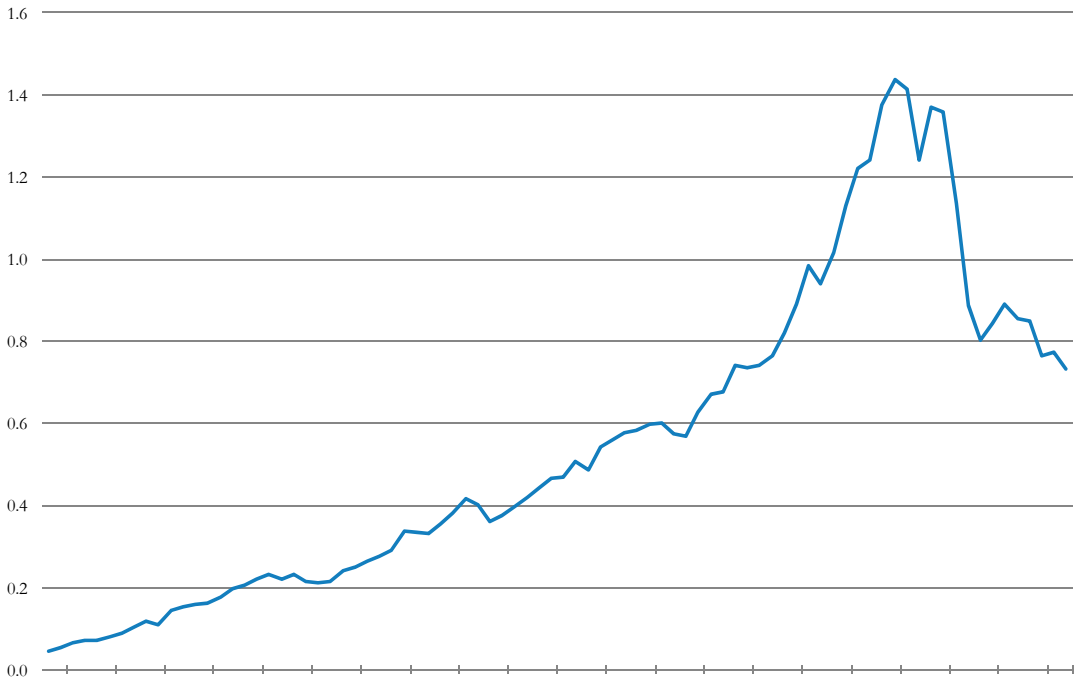

**Source:** *The Economist* (http://www.economist.com/node/17929057)

**Figure A3:** Long-Term Mutual Funds' Cash and Cash Equivalents Holdings
*$ billions*



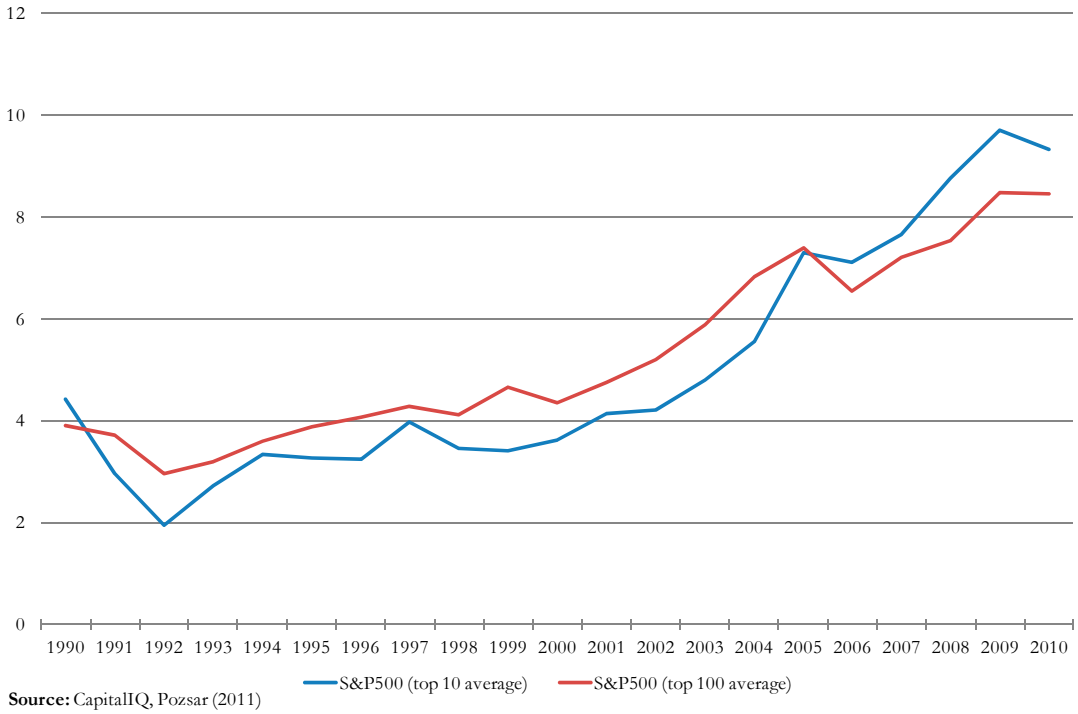

**Source:** ICI, Pozsar (2011)

**Figure A4:** Securities Lenders' Holdings of Cash and Cash Equivalents
*$ trillions*



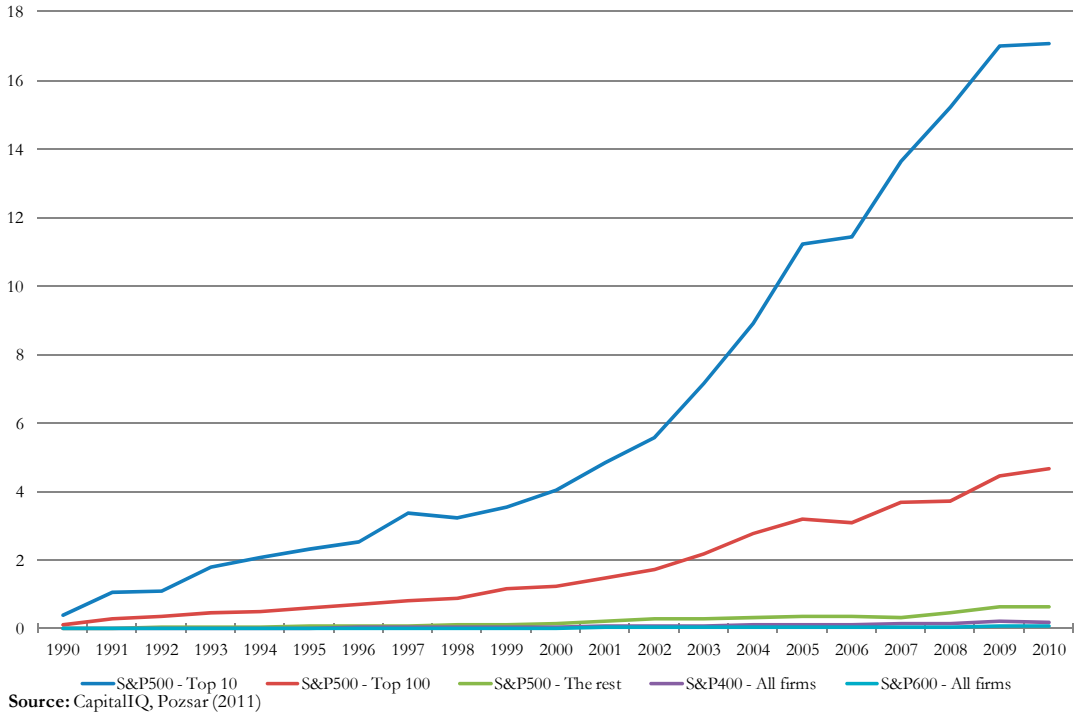

**Source:** RMA, Pozsar (2011)

**Figure A5:** Cash and Cash Equivalents as a Share of Total Assets
*Non-financial corporations, %*




**Source:** CapitalIQ, Pozsar (2011)

**Figure A6:** Non-Financial Corporations Cash and Cash Equivalent Holdings
*averages, $ billions*




**Source:** CapitalIQ, Pozsar (2011)

**Figure A7:** Top Holdings of Cash and Cash Equivalents

**Holdings of Cash and Cash Equivalents**

*Ranked by 2010 balances, $ millions*

| Rank | Company Name | 2010 | 2009 | 2008 | 2007 | 2005 |
|---|---|---|---|---|---|---|
| 1 | General Electric Co. | 78,958 | 70,488 | 48,187 | 15,731 | 8,825 |
| 2 | Johnson & Johnson | 19,355 | 15,810 | 10,768 | 7,770 | 16,055 |
| 3 | Chevron Corp. | 14,060 | 8,716 | 9,347 | 7,362 | 10,043 |
| 4 | Dell Inc. | 13,913 | 10,635 | 8,352 | 7,764 | 7,054 |
| 5 | Google Inc. | 13,630 | 10,198 | 8,657 | 6,082 | 3,877 |
| 6 | Merck & Co. Inc. | 10,900 | 9,311 | 4,368 | 5,336 | 9,585 |
| 7 | Apple Inc. | 10,734 | 7,609 | 7,236 | 9,162 | 4,150 |
| 8 | IBM Corp. | 10,661 | 12,183 | 12,741 | 14,991 | 12,568 |
| 9 | Oracle Corp. | 10,420 | 14,919 | 7,353 | 6,733 | 2,837 |
| 10 | HewlettPackard Company | 9,934 | 13,547 | 11,189 | 9,903 | 11,934 |
| 11 | ConocoPhillips | 9,454 | 542 | 755 | 1,456 | 2,214 |
| 12 | Unitedhealth Group, Inc. | 9,123 | 9,800 | 7,426 | 8,865 | 5,421 |
| 13 | The Coca-Cola Company | 8,517 | 7,021 | 4,701 | 4,093 | 4,701 |
| 14 | News Corp. | 8,456 | 7,266 | 3,621 | 3,495 | 5,243 |
| 15 | Exxon Mobil Corporation | 7,825 | 10,693 | 31,437 | 33,981 | 28,671 |
| 16 | WalMart Stores Inc. | 7,395 | 7,907 | 7,275 | 5,492 | 6,193 |
| 17 | The Dow Chemical Company | 6,894 | 2,846 | 2,800 | 1,736 | 3,806 |
| 18 | Verizon Communications Inc. | 6,668 | 2,009 | 9,782 | 1,153 | 760 |
| 19 | Ford Motor Co. | 6,301 | 9,762 | 6,377 | 20,678 | 13,388 |
| 20 | Eli Lilly & Co. | 5,993 | 4,463 | 5,497 | 3,221 | 3,007 |
| Top 10 | | 192,565 | 173,416 | 128,198 | 90,834 | 86,929 |
| Top 20 | | 269,191 | 235,725 | 207,869 | 175,003 | 160,332 |

**Holdings of Cash and Cash Equivalents**

*Ranked for each year on a dynamic and "anonymous" basis, $ millions*

| Rank | 2010 | 2008 | 2005 | 2003 | 2000 | 1995 | 1990 |
|---|---|---|---|---|---|---|---|
| 1 | 78,958 | 48,187 | 28,671 | 13,576 | 8,195 | 7,259 | 3,853 |
| 2 | 19,355 | 31,437 | 16,055 | 12,664 | 7,080 | 5,750 | 1,896 |
| 3 | 14,060 | 12,741 | 13,388 | 10,626 | 4,910 | 3,730 | 1,430 |
| 4 | 13,913 | 11,189 | 12,568 | 7,971 | 4,278 | 2,839 | 670 |
| 5 | 13,630 | 10,768 | 11,934 | 7,790 | 4,166 | 2,458 | 609 |
| 6 | 10,900 | 9,782 | 10,043 | 7,290 | 4,115 | 2,323 | 403 |
| 7 | 10,734 | 9,347 | 9,585 | 6,149 | 3,994 | 1,847 | 390 |
| 8 | 10,661 | 8,657 | 8,903 | 5,427 | 3,563 | 1,668 | 309 |
| 9 | 10,420 | 8,352 | 8,825 | 5,377 | 3,531 | 1,646 | 270 |
| 10 | 9,934 | 8,346 | 7,816 | 5,199 | 3,407 | 1,645 | 265 |
| 11 | 9,454 | 7,976 | 7,324 | 4,943 | 3,374 | 1,559 | 256 |
| 12 | 9,123 | 7,916 | 7,054 | 4,806 | 3,301 | 1,508 | 204 |
| 13 | 8,517 | 7,426 | 6,258 | 4,317 | 3,182 | 1,463 | 186 |
| 14 | 8,456 | 7,353 | 6,193 | 4,266 | 2,976 | 1,408 | 179 |
| 15 | 7,825 | 7,275 | 5,421 | 4,225 | 2,610 | 1,364 | 173 |
| 16 | 7,395 | 7,236 | 5,412 | 4,173 | 2,543 | 1,201 | 171 |
| 17 | 6,894 | 6,377 | 5,243 | 3,917 | 2,537 | 1,167 | 166 |
| 18 | 6,668 | 5,844 | 5,151 | 3,777 | 2,430 | 1,140 | 140 |
| 19 | 6,301 | 5,653 | 4,701 | 3,724 | 2,328 | 1,138 | 132 |
| 20 | 5,993 | 5,497 | 4,440 | 3,658 | 2,297 | 1,083 | 129 |
| Top 10 | 192,565 | 158,806 | 127,788 | 82,069 | 47,239 | 31,165 | 10,095 |
| Top 20 | 269,191 | 227,358 | 184,985 | 123,875 | 74,816 | 44,196 | 11,831 |

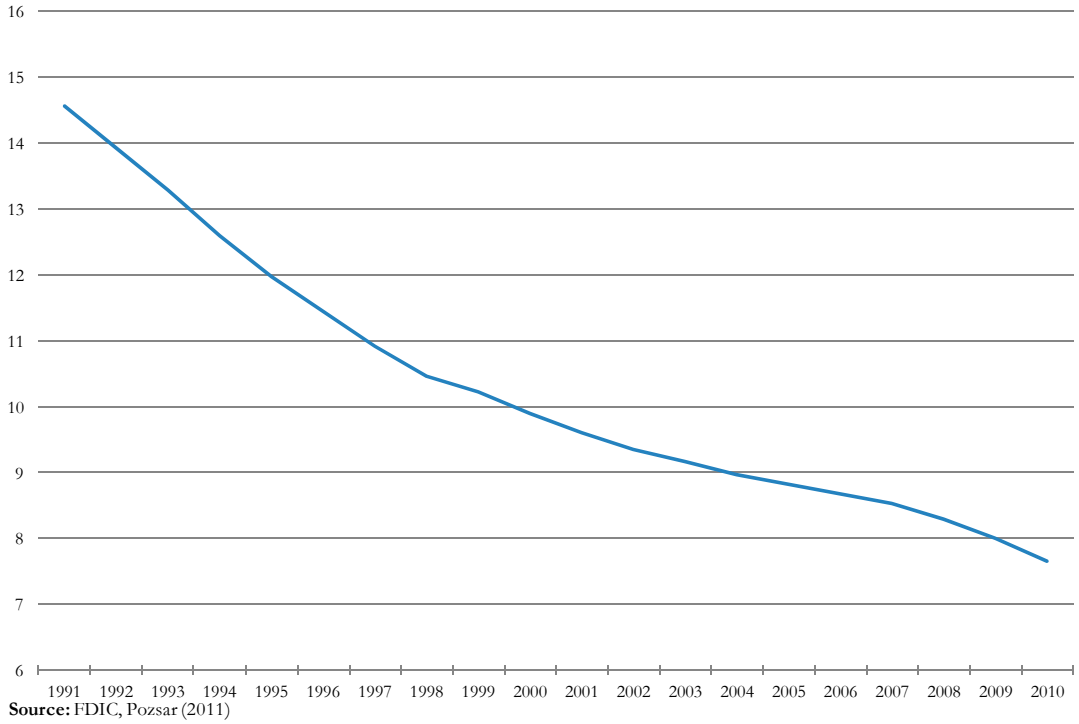
Colors indicate cash and equivalents portfolios of: more than $10bn; between $10 and $7.5bn; between $7.5 and $5bn; between $5 and $2.5bn; and less than $2.5bn

Red and green borders indicate corporations with significant finance company subsidiaries that have boosted their cash holdings in anticipation of regulatory measures.

**Source:** Capital IQ; Pozsar (2011)

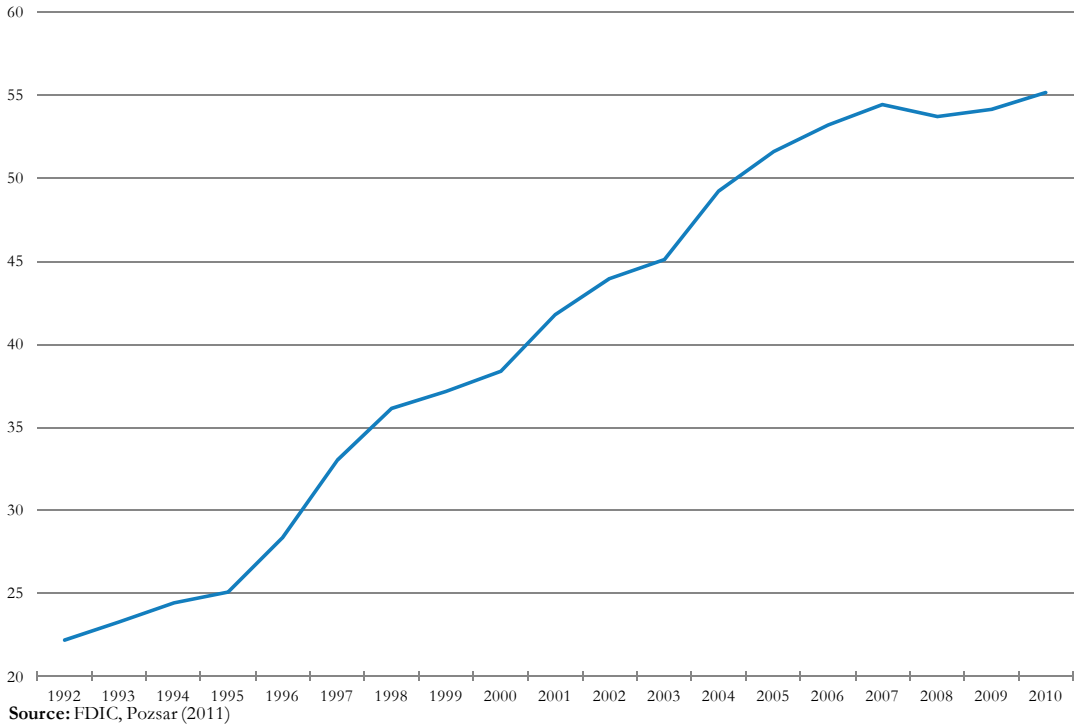
**Figure A8:** The Number of FDIC Insured Banks in the U.S.

*thousands*



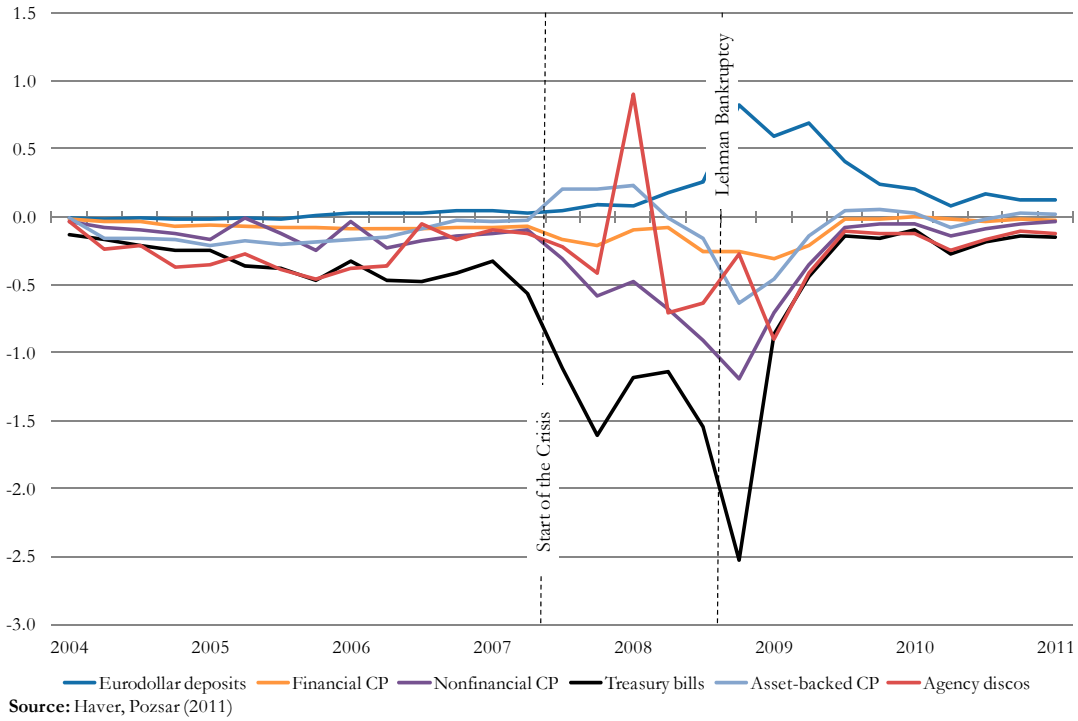

**Source:** FDIC, Pozsar (2011)

**Figure A9:** Counterparty Diversification for Large Cash Investors Is Getting Harder
*Top 10 banks share of all FDIC insured bank assets, rolling, dynamic top 10, % share*




**Source:** FDIC, Pozsar (2011)

**Figure A10:** Yield Difference Between 3-mo. CDs and Other Instruments
*ppts*




**Source:** Haver, Pozsar (2011)

**Figure A11:** Securities Lenders' Cash Collateral Reinvestment Account Size (in $ trillions) and Composition (in %)

**Securities Lending:**
*Cash collateral under management, $ trillion*

| | 2005 | 2006 | 07H1 | 07H2 | 08H1 | 08H2 | 09H1 | 09H2 | 10H1 | 10Q3 | 10Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cash Collateral AuM:** | | | | | | | | | | | |
| Global market (incl. U.S. market) | - | 2.54 | 3.28 | 3.56 | 3.60 | 2.56 | 1.73 | 1.80 | 1.91 | 1.85 | - |
| U.S. market only | 0.85 | 1.03 | 1.27 | 1.22 | 1.65 | 1.24 | 0.83 | 0.85 | 0.83 | 0.85 | 0.78 |

**Short-Term Investments:**
*% of total cash collateral AuM*

| | 2005 | 2006 | 07H1 | 07H2 | 08H1 | 08H2 | 09H1 | 09H2 | 10H1 | 10Q3 | 10Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outright Holdings** | | | | | | | | | | | |
| *Traditional Bank Liabilities:* | | | | | | | | | | | |
| Bank deposits | 13.8% | 13.9% | 15.4% | 14.1% | 14.4% | 7.9% | 7.3% | 11.4% | 15.8% | 15.3% | 14.1% |
| **Total** | **13.8%** | **13.9%** | **15.4%** | **14.1%** | **14.4%** | **7.9%** | **7.3%** | **11.4%** | **15.8%** | **15.3%** | **14.1%** |
| *Shadow Bank Liabilities:* | | | | | | | | | | | |
| Repurchase agreements | 29.5% | 27.7% | 27.6% | 28.8% | 29.4% | 26.2% | 28.2% | 27.5% | 30.5% | 29.8% | 32.2% |
| Asset-backed securities (incl. ABCP) | 23.4% | 25.2% | 27.5% | 24.3% | 16.6% | 17.3% | 15.3% | 13.8% | 10.2% | 8.1% | 7.6% |
| Commercial paper | 6.5% | 5.9% | 5.2% | 3.9% | 3.7% | 4.1% | 5.8% | 8.9% | 7.7% | 8.6% | 9.0% |
| Funding agreements | 0.7% | 0.9% | 1.5% | 0.8% | 0.8% | 0.9% | 0.2% | 0.1% | 0.1% | 0.1% | 0.1% |
| Other instruments (VRDOs, etc.) | 4.2% | 3.3% | 2.6% | 1.8% | 1.1% | 1.5% | 2.0% | 2.1% | 0.7% | 1.4% | 0.1% |
| **Total** | **64.4%** | **63.0%** | **64.5%** | **59.6%** | **51.6%** | **50.0%** | **51.4%** | **52.5%** | **49.2%** | **48.1%** | **48.9%** |
| **Intermediated Holdings** | | | | | | | | | | | |
| *Regulated and Unregulated Intermediaries:* | | | | | | | | | | | |
| Money market and other funds | 1.8% | 2.5% | 1.5% | 2.5% | 3.3% | 3.7% | 6.4% | 7.4% | 8.4% | 10.4% | 12.5% |
| **Total** | **1.8%** | **2.5%** | **1.5%** | **2.5%** | **3.3%** | **3.7%** | **6.4%** | **7.4%** | **8.4%** | **10.4%** | **12.5%** |
| **Aggregate Measures** | | | | | | | | | | | |
| Deposits | **13.8%** | **13.9%** | **15.4%** | **14.1%** | **14.4%** | **7.9%** | **7.3%** | **11.4%** | **15.8%** | **15.3%** | **14.1%** |
| Deposits "alternatives" | **66.2%** | **65.5%** | **66.1%** | **62.0%** | **54.9%** | **53.6%** | **57.8%** | **60.0%** | **57.5%** | **58.4%** | **61.5%** |
| **Ratio** | **4.8** | **4.7** | **4.3** | **4.4** | **3.8** | **6.8** | **7.9** | **5.3** | **3.6** | **3.8** | **4.4** |

**Medium-Term Investments:**
*% of total cash collateral AuM*

| | 2005 | 2006 | 07H1 | 07H2 | 08H1 | 08H2 | 09H1 | 09H2 | 10H1 | 10Q3 | 10Q4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outright Holdings** | | | | | | | | | | | |
| Corporate bonds (incl. MTNs) | 20.0% | 20.6% | 18.5% | 23.9% | 30.5% | 38.5% | 34.9% | 28.6% | 26.7% | 26.3% | 24.4% |

[1]Institutional cash balances in traditional bank liabilities.
[2]Institutional cash balances in private, secured money market instruments.
[3]Institutional cash balances' intermediated holdings of secured as well as unsecured bank exposures.

**Source:** RMA, Data Explorers, Pozsar (2011)

**Figure A12:** The Portfolio Allocation of the Rest of the World's Short-Term Dollar Balances

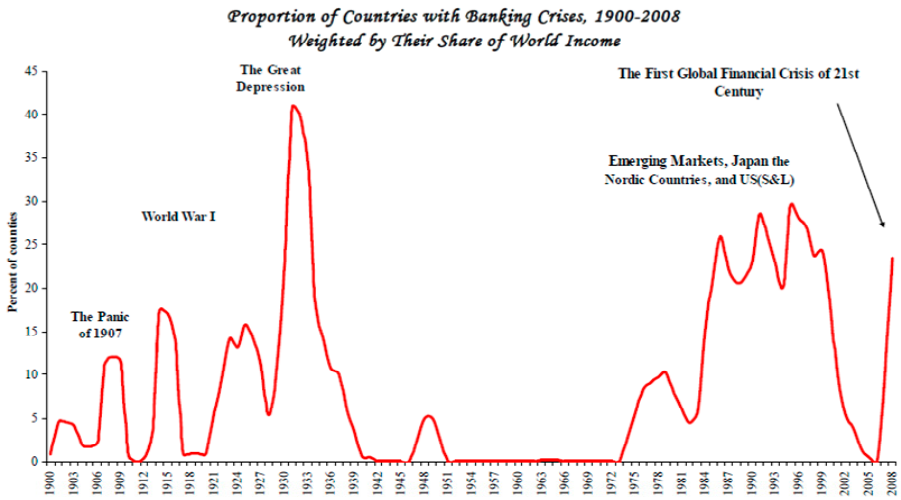
**Short-Term Foreign Funding of the U.S.**
*$ billions*

| | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 |
|---|---|---|---|---|---|---|---|---|
| **Traditional Bank Liabilities:** | | | | | | | | |
| Bank deposits (CDs) | 40.5 | 53.9 | 33.4 | 33.9 | 27.2 | 26.1 | 16.3 | 17.9 |
| **Total** | **40.5** | **53.9** | **33.4** | **33.9** | **27.2** | **26.1** | **16.3** | **17.9** |
| **Government Obligations:** | | | | | | | | |
| Treasury bills | 862.1 | 378.5 | 229.1 | 253.2 | 283.8 | 316.9 | 268.6 | 23.2 |
| Agency discos | 89.8 | 173.6 | 109.0 | 147.0 | 150.0 | 123.8 | 97.1 | 88.1 |
| **Total** | **951.9** | **552.1** | **338.1** | **400.2** | **433.8** | **440.7** | **365.7** | **111.3** |
| **Shadow Bank Liabilities:** | | | | | | | | |
| Financial CP | 73.5 | 73.6 | 121.6 | 47.9 | 25.5 | 60.4 | 39.4 | 34.2 |
| ABCP | 42.3 | 84.8 | 115.6 | na | na | na | na | na |
| Other | 122.1 | 27.3 | 55.9 | 18.4 | 13.0 | 13.4 | 7.8 | 6.0 |
| **Total** | **237.9** | **185.7** | **293.1** | **66.3** | **38.5** | **73.8** | **47.2** | **40.2** |
| **Aggregate Measures:** | | | | | | | | |
| Deposits (%) | 3.3 | 6.8 | 5.0 | 6.8 | 5.4 | 4.8 | 3.8 | 10.6 |
| Deposits "alternatives" (%) | 96.7 | 93.2 | 95.0 | 93.2 | 94.6 | 95.2 | 96.2 | 89.4 |
| **Ratio** | **29.4** | **13.7** | **18.9** | **13.8** | **17.4** | **19.7** | **25.3** | **8.5** |

[1] Institutional cash balances in traditional bank liabilities.
[2] Institutional cash balances in government-guaranteed obligations.
[3] Institutional cash balances in private, secured money market instruments.

**Source:** TIC; Pozsar (2011)

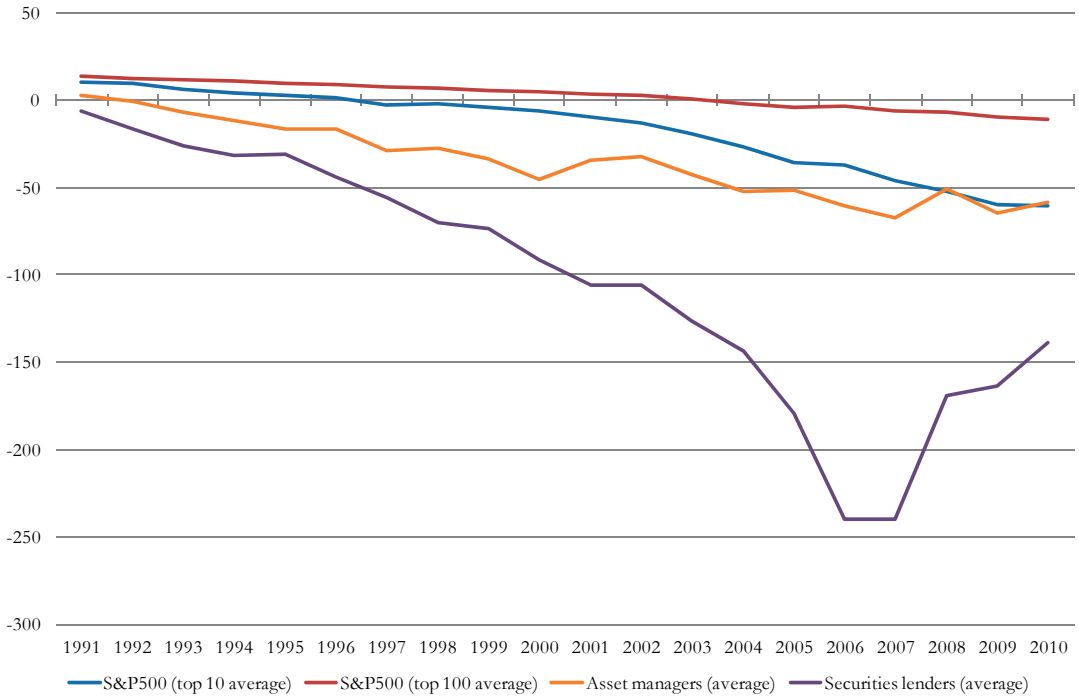
## **Figure A13:** The Frequency of Banking Crises




**Source:** Reinhart and Rogoff (2010)

**Figure A14:** Still Not Enough Banks to Source Safety for Cash Pools

*# of additional banks needed to get safety through insured, $250,000 deposits, thousands*




**Source:** ISDA, CapitalIQ, RMA, ICI, FDIC, Pozsar (2011)

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