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Crisis Liquidity Facilities with Nonbank Counterparties: Lessons from the Term Asset-Backed Securities Loan Facility[1]

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Abstract

The Term Asset-Backed Securities Loan Facility (TALF), which addressed strains in the asset-backed securities market, was an unusual crisis facility because it provided loans to a wide range of nonbank financial institutions. Using new, detailed loan-level data, we study whether institutional differences across nonbanks affected nonbanks' support for key program goals--stabilizing markets quickly, winding down the program when conditions normalized, providing liquidity to a wide range of assets, and internalizing credit risk rather than shifting it to the government. As the program terms were the same for all TALF borrowers, our study can examine the role of institutional constraints.

Keywords: Nonbank Financial Institutions, Securitization, Lender of Last Resort, Term Asset-Backed Securities Loan Facility, TALF

JEL Codes: E52, E58, G12, G23

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1. Introduction

The 2007-08 global financial crisis and the 2020 financial market dislocations during the COVID-19 pandemic led to extraordinary lender-of-last-resort interventions by central banks into financial markets. Absent these interventions, the turmoil in markets would almost certainly have deepened the already severe recessions experienced in both crises, a point made in several speeches by Federal Reserve officials (e.g., Bernanke 2009 and Powell 2020) and buttressed by the literature (most notably Bernanke 1983) arguing that financial frictions were fundamental to transforming what might have been a severe recession in the U.S. in the late 1920s and early 1930s into the Great Depression.

Our paper studies one such intervention, the Term Asset-Backed Securities Loan Facility (TALF) in 2008-10 (TALF 1.0) and 2020 (TALF 2.0). TALF provided liquidity to the asset-backed securitization (ABS) market, a market that financial institutions rely on for funding loans to households and businesses. The ABS market came to a standstill in both episodes, with the result that the cost and availability of credit to consumers and businesses tightened dramatically.[2]

TALF induced investors to return to the market by providing longer-term (three- or five-year), non-recourse loans without mark-to-market provisions that were collateralized by certain ABS. The term feature of the loan provided funding certainty; the non-recourse feature capped investors' potential losses at their equity "haircut;" and the lack of mark-to-market provisions assured investors would not face destabilizing margin calls. To protect the government, the ABS securing the loan was required to be rated AAA; the TALF interest rate was set well above the yields on the ABS in non-stressed times; the collateral haircuts were set above the loss rates on AAA securities in all but extreme historical circumstances; and, the program reviewed the ABS collateral as part of the TALF loan approval process.[3]

[2] The effect on access to credit was much larger in 2008 than in 2020 because ABS spreads were dislocated for much longer in 2008. Nonetheless, Eisen (2020) provides one example of the effects in 2020.
[3] TALF borrowers were vetted through TALF agents for compliance with applicable rules, laws, and regulations.

TALF was an unusual facility because most of its borrowers were nonbank institutions such as insurance companies, mutual funds, hedge funds and other private capital funds, and REITs. Most other crisis facilities provided loans to banks or broker-dealers, or the facility purchased assets and so made no loans.

The use of nonbank counterparties both was novel and involved a new set of risks to the Federal Reserve and the Treasury (which provided equity capital to cover nonbank losses). Since the Federal Reserve had no pre-existing relationship with these nonbank institutions, it could not predict how they would behave as counterparties. And since the nonbank institutions were not supervised by the Federal Reserve, and had no expectation of an ongoing relationship with the Federal Reserve after TALF ended, they had a higher incentive than banks to try to game the system and shift risk to the government.

In this paper, we use detailed, previously unexplored loan-level data from the TALF program to study the behavior of nonbanks as counterparties. We consider which types of nonbanks acted in a way that supported program goals, in the sense of (1) participating in the program right at its onset, and thereby helping to stabilize ABS markets quickly; (2) repaying TALF loans when market conditions normalized, and thereby winding down the program when it was no longer needed; (3) investing in a broad range of assets, and thereby restoring liquidity to a wider swathe of the ABS market; and (4) internalizing credit risk rather than trying to shift it to the government.

We find that investors' institutional constraints were a key determinant of whether their behavior supported the program goals. Investors with flexible investment guidelines, such as hedge funds, insurance companies and pension funds, were active early participants. In contrast, some types of private capital funds needed time to recruit investors and draw up governing documents. Private capital funds and other investors whose investment decisions were driven primarily by capital gains prepaid loans quickly, while traditional ABS investors who are more motivated by interest income, such as insurance companies, pension funds, and REITs, tended to buy and hold ABS for more extended periods.

Private capital funds that had stable longer-term funding were more likely to invest in longer-duration securities. These findings suggest that liquidity facilities that are addressing multiple objectives might be well-served by allowing a broad range of entities to participate.

We find that the propensity of an investor to try to shift risk to the government depended on its ability to obtain funding outside of TALF. In the initial months of TALF 1.0, hedge funds and REITs were conservative in the ABS that they submitted as loan collateral, but as their external sources of funding became more robust and they were less dependent on TALF funding, they shifted toward submitting more risky collateral within the required AAA space.[4] Consistent with this finding, in the last months of TALF 1.0, hedge funds and REITs were disproportionately more likely to submit collateral that was subsequently rejected by FRBNY after a credit review.

We complement this analysis by looking at the price impact of collateral rejections. We find collateral rejections had significant negative price impacts early in TALF 1.0 but much smaller price impacts later.[5] The early negative price response further supports the idea that early rejections were costly to investors looking to borrow from TALF, likely because the rejection forced them to seek alternative long-term private funding (or sell the rejected ABS) in strained financial conditions. The muted price response in later subscriptions of TALF 1.0 suggests investors were less concerned about funding risk when conditions had normalized, which increased the incentive for investors to attempt to shift risk to the government. Even so, the reviews and other TALF safeguards appeared effective as there were no defaults or losses to the government in TALF 1.0 or TALF 2.0.

[4] Because of the deterioration in CMBS underwriting and structuring before the global financial crisis (see Stanton and Wallace, 2018), investors had concerns about the credit quality of many AAA-rated CMBS. Indeed, we show in Table 7 that several of the CMBS that were submitted as TALF collateral were subsequently downgraded.

[5] Collateral reviews occurred for all CMBS in TALF 1.0 and TALF 2.0. New-issue ABS were reviewed for TALF 1.0 starting in November 2009 and for all subscriptions in TALF 2.0. SBA-guaranteed ABS were not reviewed.

Our paper also highlights how the government's goals can work at cross-purposes with each other. Although the reviews and associated collateral rejections protected the government, they weighed on the goal of providing liquidity to a range of securities. After several loan requests were denied in October 2009, nonbanks with strict investment parameters and limited access to funding withdrew from the CMBS program. Subsequent loan requests were primarily collateralized with securities that had been accepted in prior subscriptions.

Finally, we highlight how central bank innovation can spur private innovation. We find that accredited investors (i.e., more sophisticated investors allowed under SEC regulations to participate in certain risky investments) primarily borrowed from TALF by investing in private-capital funds that were newly created solely to invest in TALF, rather than by investing in existing funds with broader mandates. This finding suggests that the economic incentives of existing funds were not well aligned with those of accredited investors looking to gain exposure to ABS through TALF.

Our paper adds to the small existing literature on TALF (Ashcraft et al., 2011; Campbell et al., 2011; Wilson, 2011; Ashcraft et al., 2012; Logan et al., 2018) by being the first to study the behavior of nonbank counterparties and their institutional constraints and among the first to look at the TALF 2.0 program.[6] Our paper also relates to the broader literature on liquidity provision and lender of last resort programs by the Federal Reserve during the global financial crisis (see, e.g., Campbell et al., 2011, Covitz et al., 2013, Fleming, 2012, Duygan-Bump et al., 2013). So far, empirical studies of the design and efficacy of these programs have focused on programs targeting one specific type of financial intermediary, most prominently broker-dealers (Acharya et al., 2017, Carlson and Macchiavelli, 2020) and money market mutual funds (Duygan-Bump et al., 2013); our paper studies a program with a broad range of intermediaries, allowing us to examine the role of institutional constraints. Our findings on the effects of

[6] Caviness et al. (2021) also discusses the TALF 2.0 program.

rejection risk on program take-up relate to the work on the consequences of uncertainty in central bank programs (Jasova, Mendicino, and Supera, 2021). Finally, we are the first to our knowledge to study the importance of institutional constraints more generally in shaping investor behavior, something we can do because all investors faced the same terms and conditions for obtaining TALF funding.

The remainder of the paper is structured as follows. Section 2 provides the motivation for the TALF programs. Section 3 describes the design of the TALF program and its borrowers, highlighting institutional differences, including how they fund themselves and invest (i.e., their general economic incentives) and regulatory considerations. Based on this review, we offer hypotheses about how different types of borrowers might interact with the program and affect its success. Section 4 provides empirical analysis of borrower behavior based on loan-level data. Section 5 concludes with a discussion of some tradeoffs involved in designing liquidity facilities that operate through nonbanks.

2. Motivation

Asset-backed securitizations are part of the nonbank credit intermediation chain.[7] Nonbank financial institutions, which tend to lack the balance sheet capacity to retain loans on their balance sheets, originate a substantial amount of consumer and business loans. To raise funding for new loans, nonbank financial institutions often turn to the securitization market, which had annual issuance in the main TALF-eligible ABS categories—consumer and small business ABS and non-agency CMBS—ranging from $150 billion to $550 billion over the past 20 years (Figure 1).[8] In the securitization process, issuers of asset-backed securities pool loans or other receivables and then fund these pools with debt securities. The securities

[7] Banks also engage in securitization activities but are less dependent on this source of funding.
[8] A subset of CLOs were eligible collateral in TALF 2.0 only.

are issued in tranches. The highly rated, low-risk tranches, which have higher payment priority and therefore can be placed with low spreads, account for most of the debt securities funding a pool.

ABS issuance was substantial prior to both crises. In 2007, $306 billion of consumer and small-business ABS and $241 billion in non-agency CMBS were issued.[9] Issuance in 2019 was somewhat smaller, with $234 billion in consumer and small-business ABS and $105 billion in non-agency CMBS issuance. In 2019, the majority of consumer and small-business issuance was collateralized by auto loans and floorplan loans used by dealers to finance their inventories (47 percent), followed by equipment loans (13 percent), credit card receivables (7 percent), and student loans (7 percent).[10] In both years, ABS funded a considerable share of loans to households and businesses. For example, in September 2008, just before ABS markets froze, securitization funded around 45 percent of both credit card and auto loans.[11]

In 2008 and 2020, securitization markets were severely disrupted. Both episodes started with a large shock to aggregate market liquidity and skyrocketing uncertainty about the economy. The shock in the first crisis was arguably the bankruptcy of Lehman Brothers on September 15, 2008 amid a collapsing housing market, and the shock in the second crisis was the announcement of lockdown measures to fight the COVID-19 pandemic in mid-March 2020. In both crises, ABS spreads shot up, but the rise in ABS spreads was greater in 2008 as structured investment vehicles and other asset-backed commercial paper (ABCP) programs, which were big buyers of ABS, collapsed amid a general loss in confidence in securitized

[9] Source. SIFMA. $490 billion was issued in CLOs and CDOs in 2007; $170 billion was issued in 2019.

[10] Smaller assets classes, which were mostly ineligible for TALF due to their small size, include securities collateralized by receivables associated with the financing of unsecured consumer loans, device payment plans, airplanes, time shares, solar panels, railcars, insurance premiums, containers, and taxes.

[11] On September 30, 2008, $460 billion of $971 billion in outstanding credit card receivables were held in securitized pools. See the Consumer Credit, G.19 statistical release, November 7, 2008. https://www.federalreserve.gov/releases/g19/20081107/. In the third quarter of 2008, $314 billion of $701 billion of outstanding auto loans were held by finance companies; we assume that these were funded entirely by securitization. See Experian Automotive, "State of the Auto Finance Market Third Quarter 2009" http://www.experian.com/assets/automotive/white-papers/2009_3Q_Automotive_Financing_Trends.pdf.

debt (Figure 2).[12] The pressures on ABS markets in 2020 were different. In March 2020, foreign central banks responded to the emerging pandemic by selling massive amounts of U.S. Treasuries; hedge funds, bond mutual funds, and mortgage REITs also looked to liquidate fixed-income securities.[13] And in both crises, ABS issuance fell. For instance, monthly auto ABS issuance in late 2008 dropped to near zero; auto issuance also fell precipitously in 2020 but bottomed out at a monthly rate around $4 billion (Figure 3).

In general, ABS markets recovered from each crisis more slowly than they had deteriorated. However, TALF-eligible asset classes, like auto ABS, seemed to recover more quickly than other ABS asset classes. For an empirical analysis of the effect of TALF on ABS spreads in both crises, see Campbell et al. (2011) and Caviness et al. (2021).

3. TALF Program Design and Borrowers

Program Design

Given the size and importance of the ABS market to the US economy, the Federal Reserve in both crises needed to provide liquidity quickly and broadly, while also satisfying its obligations under its authorizing legislation, section 13(3) of the Federal Reserve Act, which included ensuring that taxpayers were protected from losses, and establishing an exit strategy as market conditions normalized.

TALF offered three- and five-year non-recourse loans to market participants to fund the purchase of two types of ABS: new-issue and legacy. The new-issue program included several types of ABS (defined based

[12] See Ashcraft, Malz, and Pozsar (2012) and Covitz, Liang, and Suarez (2013) for connections between the collapse of the asset-backed commercial paper market and ABS markets in 2008. For evidence of the effects of ABS market disruptions, see Benmelech, Meisenzahl, and Ramcharan (2017), who show that the collapse of ABS markets in 2008 led to a drop in auto sales.

[13] See "A Retrospective on the March 2020 Turmoil in Treasury and Mortgage-Backed Securities Markets," in Board of Governors of the Federal Reserve System (2020b), Vissing-Jorgensen (2021), and Ma, Xiao, and Zeng (forthcoming).

on the types of consumer or business loans backing the securities) as eligible collateral, while the legacy program funded only existing ABS backed by commercial mortgages (i.e., CMBS trading in the secondary market).[14] The Fed funded only AAA-rated tranches, the safest and largest tranches in securitizations.

The ABS served as collateral for the loan. The loans were for less than the value of the collateral by a specified percentage of the price (i.e., a haircut). Haircuts varied by asset classes and by the weighted average maturity of the payments on the security, referred to as weighted average life (WAL). Haircuts were estimated to exceed the expected losses on the ABS in all but extraordinarily severe scenarios. The haircut put borrowers in a first-loss position, and so the borrower had an incentive to conduct due diligence on the ABS. The haircut also protected the Federal Reserve from credit losses.

The TALF loan interest rate varied by the type and maturity of the ABS and was set above the rate on equivalent ABS in normal market conditions and below the rate in times of acute stress. Therefore, the TALF rates were attractive to borrowers during periods of market stress, but in non-stressful periods gave borrowers an incentive to repay the loan. The somewhat elevated interest rates on the TALF loans also provided an additional buffer for the government to absorb any credit losses.

Other TALF loan terms were also attractive to potential borrowers in stressed market conditions. First, the loans were not subject to margin calls and thus guarded investors against the risk of having to post more collateral if ABS spreads spiraled upward. Second, the TALF loans could be prepaid early without penalty. Third, TALF loans only had recourse to the collateral and not the borrower and so provided insurance against the tail risk of extraordinarily large declines in ABS valuations. Fourth, the TALF loans provided long-term financing at a time when many private lenders were shortening maturity.

[14] The program term sheets are available at https://www.newyorkfed.org/markets/talf_terms.html (2009-10) and https://www.federalreserve.gov/newsevents/pressreleases/files/monetary20200728a6.pdf (2020). Five-year loans were offered only in TALF 1.0 and only for certain types of securities. TALF 1.0 also accepted new-issue CMBS as collateral, but we gloss over this category since only one such security was ever pledged.

When the terms and conditions of the legacy CMBS program in TALF 1.0 were first released in May 2009, they differed from those of the already launched new-issue TALF 1.0 program in an important respect: the Federal Reserve Bank of New York (FRBNY) announced it would conduct independent reviews of the credit quality of the CMBS, and reject CMBS that despite a AAA rating were deemed too risky. This review was an important risk mitigant because the rating agencies' methodologies for CMBS deteriorated in the years before the global financial crisis (Stanton and Wallace, 2018; Ashcraft, Malz, and Poszar, 2012), and so a AAA rating was not necessarily a strong signal of credit quality. Indeed, Campbell et al. (2011) show the CMBS submitted as collateral in TALF 1.0 were riskier than the pool of eligible CMBS, and we show in Table 7 that a fair number of CMBS rejected after the TALF review were subsequently downgraded by the rating agencies.

The review of legacy CMBS, however, could lead to costs for potential borrowers. TALF borrowers were required to purchase the CMBS before each subscription (TALF took loan requests at specified subscription dates and then decided whether to fund the requests), so if FRBNY rejected the collateral, the borrower would be forced to obtain alternative long-term funding or sell the security. Alternative funding might be expensive or difficult to obtain, and a buyer for the security difficult to find, when financial conditions were strained. The new-issue program also introduced a credit review process in November 2009. [15] However, new-issue structures were reviewed prior to the actual ABS being issued, so borrowers knew before they purchased new-issue ABS whether it was TALF-eligible. As a result, the new-issue reviews did not create funding risk for borrowers.

Borrowers

We divide TALF borrowers into two groups: *Traditional ABS Investors* (invested in AAA-rated ABS before TALF) and *Opportunistic ABS Investors* (did not invest in AAA-rated ABS before TALF). In TALF 1.0, both

[15] https://www.federalreserve.gov/newsevents/pressreleases/monetary20091005b.htm

types borrowed from the program, whereas in TALF 2.0, only *Opportunistic ABS Investors* borrowed. Each group contains a few different types of nonbank investors. Table 1 summarizes information on each type of investor, including information on their own investor base, funding structure, economic incentives, and TALF-relevant regulatory constraints. The data appendix describes how we classified TALF borrowers by investor type.

Traditional ABS Investors

Insurance companies. Insurance companies purchase ABS and other fixed-income securities because the timing of cash flows on fixed-income securities closely aligns with the timing of cash flows on their liabilities, which are primarily payments on the variable annuities. As a result, insurance companies tend to buy-and-hold their investments until maturity and rely on ABS for stable interest income rather than capital gains. Four of the six largest insurance companies, as measured by net assets in 2009, borrowed directly from TALF 1.0.[16] A few smaller companies also participated in TALF 1.0, directly or as "material" investors in a hedge fund or TALF-only fund that borrowed from TALF.[17]

Pension funds. Like insurance companies, pension funds tend to buy-and-hold investments for stable income. Only two large state pension funds and four small local pension funds borrowed directly from TALF 1.0. Many other pension funds borrowed indirectly from TALF by investing in TALF-only or other private capital funds, including thirty-seven in TALF 1.0, and another fifteen in TALF 2.0.

Mutual funds and closed-end funds. Mutual (open-end) funds and closed-end funds provide exposure to fixed-income assets for retail investors. The investment guidelines of the funds tend to encourage diversification and discourage large concentrations in any given asset. The 1940 Investment Company Act

[16] Net assets are measured at the level of the operating entity and from statutory financial statements accessed through S&P Global. We thank Mike Batty for his help with this calculation.

[17] A material investor is defined as an entity or individual with a 10 percent or greater beneficial ownership interest in any class of securities of a TALF borrower. The material investor data are available here for TALF 1.0: https://www.federalreserve.gov/regreform/files/talf.borrower.xls.

imposes several restrictions on mutual and closed-end funds to protect retail investors, including a prohibition on debt exceeding one-third of assets, as well as provisions on safekeeping of assets. Mutual funds can be subject to redemption pressures. Twenty-five mutual and closed-end funds from six large fund families borrowed from TALF 1.0. No such funds borrowed from TALF 2.0. For ease of exposition we refer to the combined category of mutual funds and closed-end funds as mutual funds.

REITs. REITs receive favorable tax treatment in exchange for investing almost entirely in real-estate related assets, including CMBS, and paying out 90 percent of income in investor dividends. Their investor base tends to purchase REITs for the high dividend payments, and so REITs look to invest in assets that generate stable income rather than capital gains. Nine REITs, including four of the five largest publicly traded REITs that focused on commercial mortgages in 2009, borrowed from TALF 1.0. [18] The REITs that borrowed from TALF 1.0 were mostly newly formed in the summer or fall of 2009 to capitalize on the dislocations in the commercial real estate market, as many pre-existing REITs failed during the financial crisis.[19] The REITs that borrowed from TALF were initially heavily focused on TALF-eligible investments and expanded their operations to other asset classes over time.[20] No REITs borrowed from TALF 2.0.

Banks and bank affiliates. One regional bank and two US affiliates of foreign banks borrowed from TALF 1.0. Since they were a very small part of aggregate TALF activity, we exclude them from the analysis.

[18] Data are from December 31, 2009, as reported in NAREIT (2010). We use data from that date because some REITs that participated in TALF came into existence in fall 2009. We count hybrid REITs as commercial mortgage REITs for this purpose.

[19] Seven out of the 14 commercial mortgage REITs that were listed in REIT Watch in September 2007 were no longer listed in September 2009. A news article in 2008 opened, "In the world of mortgage REITs, the game being played is no longer *Who Wants to be a Millionaire?* Instead, it's turned into a vicious and bloody game of *Survivor."* Harden (2008).

[20] Commercial Mortgage Alert, August 7, 2009, "Ex Goldman Exec Huang Lands at Starwood."

Opportunistic ABS Investors

TALF-only funds sponsored by hedge funds and other asset managers. TALF-only funds were likely created to meet institutional investor demand for TALF-funded investments, as many such investors may have lacked the scale or sophistication to borrow directly from TALF. Institutional investors could also have invested in private capital funds that borrowed from TALF as part of a broader investment strategy, but they may have wanted exposure only to TALF-funded investments. Fund managers were likely happy to design such funds, as they share in the gains but not the losses from their funds, and so may have found it more profitable to create a series of small, specialized funds than a broad, diversified fund in which some of the gains would have been offset by losses.[21] In addition, managers of smaller funds may have faced fewer registration and reporting requirements. [22]

Most TALF-only funds were structured as fixed-life partnerships, typically with terms that matched the maximum maturity loan under the TALF program. The compensation of managers was standard for a private capital fund: A management fee plus a share of profits that exceed a hurdle rate. Private placement memorandums (PPMs) for these funds indicate that management fees ranged from 0.25 to 2 percent, with most firms near 1 percent; hurdle rates ranged from 0 to 10 percent, with most around 8 percent; and the excess profit share ranged from 10 to 40 percent, with most between 10 and 20 percent. Investors faced strict limits on their ability to withdraw their capital before the end of the term. The partnerships had narrow investment parameters—typically assets eligible for TALF funding—and the general partner had to return the investors' capital if they could not find investment opportunities consistent with the fund parameters. The vehicles were open only to accredited investors, although some

[21] We thank Andrea Rossi for this insight.
[22] See American Bar Association (2016) for an overview of these requirements.

investors—such as pension funds and state 529 plans—were investing on behalf of a much larger group of beneficiaries. Forty-four such funds borrowed from TALF 1.0, and eleven borrowed from TALF 2.0.

Fixed-life partnerships. These partnerships were similar in structure to TALF-only funds but with more general investment mandates. Some partnerships were created in 2008 to invest in opportunities created by financial-crisis market dislocations. Others were private equity funds with mandates to invest in real estate related assets. Eight of these funds borrowed from TALF 1.0 and four borrowed from TALF 2.0.

Hedge funds. Hedge funds are open-ended, with no fixed life, and have flexible investment parameters. In return for this greater flexibility, investors can redeem their investments in hedge funds, although the funds can restrict these redemptions in time of stress. Hedge fund investment strategies also tend to rely heavily on leverage. Hedge funds are only open to accredited investors, although some of these investors are entities such as pension funds with a broader group of beneficiaries. The manager compensation structure for these funds is similar to that of the fixed-life partnerships and the TALF-only funds. Forty-one hedge funds borrowed from TALF 1.0 and six borrowed from TALF 2.0.

Private individuals. Individuals borrowed from TALF through either pre-existing or newly created investment vehicles. These individuals, or their families or family trusts, were the sole beneficiaries of these vehicles. This category also includes some family foundations. Twenty-one such investors borrowed from TALF 1.0, and none borrowed from TALF 2.0.

Hypotheses about Borrower Behavior

Before discussing our empirical findings, we first lay out four plausible TALF program objectives and hypothesize which investors were likely to be supportive of each objective.

Objective i*:* Stabilizing markets quickly. We expect that existing firms with flexible investment parameters, such as hedge funds, pension funds, and insurance companies, will be among the early borrowers. In contrast, funds that needed to be set up, such as TALF-only funds, or have their governing documents amended to participate in the program may not have been able to respond as nimbly. In addition, investors that faced their own funding pressures might have found TALF loans an attractive opportunity. Looking at *Traditional ABS Investors*, for example, life insurance companies that had issued funding-agreement backed securities faced funding pressure in 2008 (Foley-Fisher, Narajabad, and Verani, 2020). Looking at *Opportunistic ABS Investors*, hedge funds experienced funding stress in both crises (Ang, Gorovyy and van Inwegen, 2011, Aragon and Strahan, 2012, Board of Governors of the Federal Reserve System, 2020a).[23]

Objective ii: Winding down program when market conditions normalize. We expect investors whose main motivation in investing in ABS is stable income, such as insurance companies, pension funds, and REITs, to hold onto their loans longer than investors whose main motivation is capital gains. In particular, the manager compensation schemes for hedge funds, fixed-income partnerships, and TALF-only funds, which typically have them share in realized portfolio gains, give them an incentive to lock in capital gains and repay their TALF loans early.

Objective iii: Providing liquidity support to a range of securities. We expect entities with stable, locked-in funding from their own investors, such as fixed-life partnerships and TALF-only funds, to be better positioned to assume the risk of investing in longer-dated securities (i.e., the greater mark-to-market volatility) during a crisis than entities with more fragile funding.

[23] See Exhibit 1 of Board of Governors (2020a). Dealers report tightening price and non-price terms to hedge funds much more than to other investors in 2020:Q2.

Objective iv: Avoid risk-shifting to the government. We expect that investors who are dependent on TALF funding will be conservative in their choice of loan collateral. Investors with funding alternatives to TALF have more of an incentive to try to shift risk to the government.

4. Empirical Analysis

We now turn to our empirical analysis of which borrowers supported each program objective.

Which investors responded nimbly to TALF?

To set the stage for this question, we first provide an overview of overall participation patterns. *Opportunistic ABS Investors*, and within this group, TALF-only funds, were the primary investors in TALF. *Opportunistic ABS Investors* accounted for 70 percent of the 167 TALF 1.0 borrowers and 77 percent of the $72 billion requested in loans (Table 2, upper panel). TALF-only borrowers accounted for 40 percent of TALF 1.0 loan requests. In TALF 2.0, total loan requests were much lower at $4.5 billion, and only 20 investors participated (Table 2, lower panel), all of which were *Opportunistic ABS Investors*. TALF-only funds took out 83 percent of loan volume.

Take up was likely lower in TALF 2.0 because ABS spreads were not as dislocated in the pandemic as in the global financial crisis. In addition, the funding strains on ABS investors were lower in the pandemic than the global financial crisis: pension funds and insurance companies did not experience significant funding pressures in 2020, while the Federal Reserve's interventions alleviated some of the pressures on mutual funds and REITs.

Low participation by *Traditional ABS Investors* in both programs may have stemmed from the fact that their business models and investment patterns are rule-based, and so they have less room to deviate from their traditional investment patterns when new opportunities emerge. In contrast, private capital funds

may have considerably more discretion. In any event, the low TALF borrowing by *Traditional ABS Investors* suggests that if TALF had provided funding only to *Traditional ABS Investors* and had not induced *Opportunistic ABS Investors* to purchase ABS, the program might have been less successful in restarting ABS markets.

Over the life of the new-issue program in TALF 1.0, the mix of investors changed. For instance, *Traditional ABS Investors*—pension funds and insurance companies—represented more than half of the dollars of loan requests in the new-issue ABS program in the first TALF 1.0 subscription in March 2009 (figure 4, new-issue ABS on left, CMBS on right). Hedge funds were a third of loan requests, and fixed-life partnerships were ten percent. TALF-only funds had minimal participation at the beginning of the program, as these funds required time to draw up their governing documents and recruit investors.[24] Take up overall was low in March and April as investors wrestled with time-consuming due diligence processes and assessed the risk associated with having the government as a counterparty.[25] These obstacles were largely resolved by May.

By summer 2009, TALF-only funds ramped up their TALF borrowing, representing more than half of new-issue ABS loan requests. Pension fund and insurance company loan requests decreased in June and were small and sporadic for the rest of the program. Hedge funds were active borrowers for the entire program, but their share of loan requests decreased after June 2009. In July 2009, mutual funds borrowed from TALF for the first time after the SEC issued a no-action letter in June 2009 that resolved a conflict between

[24] In 2008, one industry participant estimated that it normally takes three months to launch a new private capital fund (Taub, 2008).

[25] TALF borrowers took out loans through TALF agents—primary dealers who served as the conduit to the TALF program—rather than directly from the Federal Reserve Bank of New York. Contract negotiations between the TALF agents and borrowers proved to be a bottleneck in TALF 1.0. Some investors were also reportedly worried that the government was an unreliable counterparty that could, for example, "retroactively change the terms, exacting new limits on what investors can pay their executives, for example, or trying to claw back profits that firms make in the program" (Irwin, 2009).

the TALF operating procedures and the requirements of the 1940 Investment Act.[26] Large-scale participation by mutual funds occurred in August and September 2009.

As TALF 1.0 was ending, TALF-only funds made up most of the new-issue loan requests. The governing documents of these funds typically only allowed the managers to invest in TALF-related assets and required the managers to return to investors any capital that they could not invest. Managers of these funds thus had an incentive to deploy as much of their capital in TALF-eligible investments as possible as TALF was ending.

In the TALF 1.0 legacy CMBS program, the pattern of loan requests by borrower type was similar to that in the new-issue ABS program. Insurance companies and pension funds played an outsized role in the first subscription in July, with 30 percent of loan requests, compared with 11 percent at all subscriptions combined. Hedge funds were about a quarter of loan requests at all subscriptions. The participation of TALF-only funds increased over time, rising from around 15 percent of loan requests in the first two subscriptions and peaking with almost 50 percent of loan requests in December 2009. Mutual funds borrowed heavily from August through November and borrowed very little thereafter. REITs, which by virtue of their tax status could invest only in CMBS, were about 15 to 20 percent of loan requests throughout.

In the TALF 2.0 program (figure 4, lower panel), hedge funds and fixed-life partnerships were early borrowers, as in TALF 1.0, and then stopped borrowing. Unlike in TALF 1.0, there was some modest TALF-only fund participation starting at the beginning of the program; since TALF 2.0 was a known entity, asset

[26] Rule 17f of the Investment Company Act of 1940 governs the custody of mutual fund assets by a primary dealer. The TALF procedures require the TALF agent to hold the TALF loan collateral and the funds for the haircut for a short period of time, which is inconsistent with Rule 17f without SEC relief. The no-action letter also allowed TALF loans to be treated equivalently to reverse repurchase agreements under the asset coverage test, thereby allowing mutual funds to hold more leverage against TALF-eligible assets. In TALF 2.0, these issues were not impediments because the SEC affirmed its earlier no-action letters before the program launched.

managers were able to put together documents and recruit investors more quickly than in TALF 1.0. As in TALF 1.0, after the early subscriptions TALF-only funds became the dominant borrower type.

Another perspective on participation is offered by examining the number of times each investor borrowed from TALF (Figure 5). In TALF 1.0, *Traditional ABS Investors* submitted loan requests in fewer subscriptions than did *Opportunistic ABS Investors*. Seventy-six percent of mutual funds, for example, requested TALF loans in only one or two months, and around 90 percent of insurance companies and 75 percent of REITs requested loans in four or fewer months. The two giant state pension funds both requested loans in only two months, whereas the four small pension funds requested loans in four to seven months.

In contrast, among the *Opportunistic ABS Investors* in TALF 1.0, only about a quarter of TALF-only funds and about half of hedge funds requested loans in one or two months, whereas 20 percent of hedge funds and 45 percent of TALF-only funds requested loans in seven or more months. The other *Opportunistic ABS Investors*—fixed-life partnerships and private individuals—were less likely to request loans in multiple subscriptions; about 75 percent of these borrowers requested loans in four or fewer months (not shown in Figure). In TALF 2.0, TALF-only funds borrowed most persistently from the program, with 27 percent borrowing in 6 separate months. All hedge funds and fixed-life partnerships borrowed in only 1 or 2 months.

On balance, our analysis of TALF loan volumes and timing, and of the participation counts, suggests hedge funds, fixed-life partnerships, pension funds, and insurance companies were most nimble, while TALF-only funds were steadier and more persistent participants.

Which investors paid off their loans quickly and helped normalize central bank balance sheets?

A second central bank objective is to limit the central bank footprint to the time of market distress. While offering long-maturity loans provides more certainty to market participants, it also means that the central

bank balance sheet may be encumbered long after the crisis has been resolved. Hence, when stress subsides, the central bank would prefer to wind down the program quickly.

Insurance companies and pension funds, consistent with their business model of being buy-and-hold ABS investors, held their loans the longest in TALF 1.0 (Figure 6). The median holding time, measured from the day the TALF loan closed to the day it was repaid, and weighted by TALF loan balance, was 707 days for insurance companies and 477 days for pension funds.[27] REITs also held for an extended time, with a median weighted holding time of 441 days, consistent with their investor base's preference for dividend income.

The median weighted holding time for TALF-only funds was also long at 440 days. Hedge funds, fixed-life partnerships, and mutual funds had shorter hold times, with medians of 331, 399, and 328 days respectively.[28] At first glance, the longer hold times for TALF-only funds are somewhat unintuitive because TALF-only funds are usually sponsored by hedge funds (about 40 percent of TALF-only funds) or asset-management companies that also sponsor hedge funds or mutual funds. However, since TALF-only funds are restricted to investing in TALF-eligible securities and have to return capital to investors once they repay the loans, they may have an incentive to retain the loans somewhat longer.

In TALF 2.0, the median weighted holding time was also a bit longer for TALF-only funds than for hedge funds and fixed-life partnerships, at 229, 209, and 140 days respectively. However, the distribution of days-held for TALF-only funds has a significantly longer right tail than that of other investors. As of January 2022, only around 60 percent of loan dollars taken out by TALF-only funds had been repaid, compared with all the loans taken out by hedge funds and fixed-life partnerships.

[27] We report the distribution of days held in Appendix Table A.1.

[28] The shorter holding period for hedge funds is consistent with von Beschwitz, Lunghi, and Schmidt (2021) who document that hedge funds close positions early in order to reallocate their capital to more profitable investments.

To ensure that these differences across borrowers are not driven by correlated variables, we estimate for TALF 1.0 a series of OLS and median regressions that control for subscription date and security characteristics:

$$Days\ held_{it} = \beta_1 Hedge\ fund_i + \beta_2 TALF\ only_i + \beta_3 Pension\ fund_i + \beta_4 Insurance_i + \beta_5 Fixed\ life_i + \beta_6 REIT_i + \beta_5 Private\ individuals_i + \alpha_t + \gamma_{WAL\ x\ floating\ rate} + \theta_{WAL\ x\ fixed\ rate} + \epsilon_{it}$$

We control for the month of loan origination α_t because ABS spreads were extremely dislocated in the early months of the program and then narrowed rapidly. Borrowers in the first couple subscriptions tended to prepay their loans early to lock in the capital gains. We include WAL-bucket fixed-effects because TALF loans must be repaid when the collateral matures, so loans extended against shorter-maturity ABS mechanically will be repaid more quickly.[29] We interact the WAL buckets with floating-rate and fixed-rate dummy variables because the Federal Reserve's second round of quantitative easing led to significant drops in longer-term interest rates from November 2010 to June 2011. Investors in long-maturity fixed-rate securities thus realized much greater capital gains than investors in comparable floating-rate securities, and these gains may have affected how long they held their TALF loans. We weight the regressions by the loan balances.

The first regression (Table 3, column 1) includes only indicator variables for the different types of investors and replicates the Figure 6 result that *Traditional ABS Investors*—pension funds and insurance companies—held on to loans longer on average than other investors. This result strengthens when we include controls for WAL and the month of TALF-loan origination (column 2). When we replace the controls with CUSIP fixed-effects (column 3), the results strengthen further, with the coefficients indicating that pension funds and insurance companies held onto their loans for 15 to 16 months longer than mutual funds (the omitted category). This specification also indicates that REITs held onto their loans

[29] WAL data were not available for many SBA that were TALF collateral. We handle this situation with an indicator variable for missing WAL data.

for a relatively long time (9 months longer than mutual funds), consistent with their investor base's preference for interest income.

In further robustness tests, we estimate median regressions (columns 4 and 5). The specification with control variables also indicates that insurance companies, pension funds, and REITs held onto their loans for a relatively long time. Our results are also robust to running the specifications without loan-balance weights (results not shown).

The results indicate that the managers of TALF-only funds only held on to their capital for a bit longer than other private capital managers, which may seem surprising since loan repayment meant that they had to return their investors' capital. However, weighing against this factor is another aspect of the managers' compensation. Since the managers received a share of the excess profits above the hurdle rate, they also had an incentive to prepay the loans and realize capital gains.

In sum, the results suggest that *Opportunistic ABS Investors*, who were more motivated by capital gains, repaid their loans more quickly than *Traditional ABS Investors*. The incentives of *Opportunistic ABS Investors* thus seem more aligned with the central bank objective of winding down the program when conditions normalize.

Which investors helped expand the range of funded assets?

A third central bank objective is to ensure that liquidity benefits are broad-based. We explore this objective by considering whether the willingness to fund long-WAL and higher-yield CMBS—two proxies for risk—varied by investor type. Shorter-WAL CMBS were less risky for multiple reasons. First, since CMBS are fixed-rate securities, shorter WALs bear less interest rate risk. Second, since most CMBS have a ten-year WAL at origination, shorter-WAL securities had less credit risk because they were more likely to be issued in the early 2000s when CMBS underwriting standards were more conservative. Third,

shorter WAL CMBS, as we will show next, were less likely to be rejected as loan collateral by FRBNY, likely because of their better credit quality. Meanwhile, yields are generally higher on more risky securities.

We focus on the CMBS program because investors could choose from around 1,350 triple-A securities in TALF 1.0 that met the program guidelines. There was also considerable heterogeneity among eligible CMBS: WALs ranged from 0.1 to 9.1 years with a median of 3.1 years, and yields ranged from 2.4 to 14.1 percent with a median of 6.9 percent.[30] We drop pension funds and private individuals from the analysis, since these two groups did not participate in TALF 2.0 and took out only a few loans collateralized by CMBS in TALF 1.0 (14 and 7, respectively; sample sizes for the other investor types are shown in Appendix Table A2). We weight each observation by loan balance, which places more emphasis on the larger investors in TALF and on the macroeconomic effects of the program.[31]

Weighted average life results. Fixed-life partnerships and TALF-only funds invested in the CMBS with the longest remaining WALs (left panel, Figure 7). In TALF 1.0, the median WAL of CMBS collateralizing loans taken out by fixed-life funds was 6.2 years and by TALF-only funds was close to 4.5 years, compared with 2.5 years for mutual funds, REITs, and hedge funds. Insurance companies chose the securities with the lowest WALs, with a median of 2.28. In TALF 2.0, shown in the right panel of Figure 8, the median WAL was again longest for fixed-life funds, at 8.5 years, followed by 5.4 years for TALF-only funds.[32]

This same pattern is apparent looking at the distribution across WAL buckets. In TALF 1.0, the loans taken out by hedge funds, mutual funds, and REITs were clustered toward low-WAL CMBS (Appendix Table A2). In contrast, the loans of TALF-only funds and fixed-life partnerships were more likely to be backed by CMBS with long WALs. Similarly, in TALF 2.0, 60 percent of loans taken out by TALF-only

[30] Data are from Trepp and are measured as of June 1, 2009.
[31] Using the unweighted sample yields similar results.
[32] The median WAL for the two loans taken out by hedge funds was 7.0 years. We do not show this number in the table because the sample size is so small.

funds, and all the loans taken out by fixed-life partnerships, were collateralized by CMBS with WALs greater than 5 years.

However, this pattern was not constant over time. Figure 8 plots the average WAL corresponding to the CMBS that collateralized loan requests for hedge funds, REITs, and TALF-only funds from August 2009 through March 2010.[33] These three types of investors borrowed significantly from the CMBS program throughout this period. The average WAL for all investors is also shown. That WAL increased from 2.83 in August to 4.83 in March, suggesting that risk appetite overall increased over this period. As indicated earlier, the average WAL for TALF-only funds was higher than for investors overall in almost all months. Likewise, for most of 2009, the average WAL for hedge funds and REITs was much lower than for investors overall. But in 2010, these WALs shot up by 2 to 3 years.

These patterns suggest that in the early stages of the global financial crisis, investors with less stable sources of funding, such as hedge funds and REITs, were conservative in their investments and uninterested in investing in more risky securities. When market funding sources stabilized, as we describe in the next section, hedge fund and REIT risk appetite appeared to return. Meanwhile, investors with locked-in funding, such as fixed-life funds and TALF-only funds, were more likely to invest in these riskier securities. Since this pattern is also apparent in TALF 2.0, when investors seemed less worried about rejection risk, the pattern may stem from investors' time horizon as well as rejection risk.

Yield results. The yield results mirror the WAL results (Table 4). In TALF 1.0, fixed-life partnerships chose the securities with the highest yields, with an average of 6.19 percent. TALF-only funds chose securities with an average yield of 5.26 percent, somewhat above the yields on CMBS chosen by REITS, hedge funds, and mutual funds. Insurance companies chose the CMBS with the lowest average yield, at 4.21 percent.[34]

[33] We drop July 2009 because loan requests overall were low in that month.
[34] These estimates are weighted by the loan amount and are based on all CMBS loan requests, including those that were rejected by FRBNY.

In TALF 2.0, yields were much lower, reflecting the low longer-term rates that had prevailed over the previous years. Average yields were a bit higher on the CMBS chosen by fixed-life partnerships than on those chosen by TALF-only funds, but the averages for both groups were around 1.5 percent.

To assess whether these differences in yields also indicate differences in risk appetite beyond that associated with investing in longer WAL securities, we estimate the following regression

$$CMBS\ Yield_{it} = \beta_1 Hedge\ fund_i + \beta_2 TALF\ only_i + \beta_3 Mutual\ fund_i + \beta_4 REIT_i + \beta_5 Fixed\ life_i + \alpha_t + \gamma_{WAL} + epsilon_{it}$$

where $\alpha_t$are subscription-date fixed effects and γ_{WAL} are indicator variables for weighted average life buckets. Subscription-date effects control for the potentially confounding factors that some types of investors participated in the program earlier than others and that yields tightened over the life of the program. Insurance companies are the omitted investor-type category.

As a benchmark, we first show the regression equivalent of the earlier unconditional comparison of means (Table 5, column 1). Fixed-life partnerships chose CMBS with yields almost 2 percentage points higher than insurance companies; TALF-only funds and mutual funds chose CMBS with yields almost 1 percentage point higher. These differences become much smaller when we control for the weighted average life of the CMBS and the subscription date, although fixed-life partnerships continue to request CMBS with yields about 45 basis points higher than insurance companies. As robustness tests, we repeat the OLS regression without loan-balance weights, and run median regressions. The results in these specifications also suggest that fixed-life partnerships take somewhat more risk than other investors.

These results are consistent with the earlier finding that investors with stable funding are more likely to invest in riskier securities. In the TALF 1.0 program, however, much of the variation in risk appears to be captured by the security's WAL. Since TALF-eligible CMBS were required to have at least two AAA ratings, it may not be surprising that yields did not vary substantially independent of WAL.

Did investors attempt to shift risk to the government by posting risky collateral?

Evidence from participation in the legacy CMBS program

In TALF 1.0, legacy CMBS was the asset class with the most scope to shift risk. Because of the deterioration in CMBS underwriting before the global financial crisis, there were CMBS with putatively AAA ratings that had high spreads because of concerns about their credit quality. Leveraging those high spreads with TALF loans, with the option to put the CMBS back to the government without penalty if the security deteriorated in value, was an attractive investment proposition.

However, in TALF 1.0, the new-issue ABS program was considerably more popular than the legacy CMBS program. Loan requests totaled $58 billion across the 13 subscriptions for the ABS program, and $32 billion for the nine months when both the ABS and CMBS programs were operational. CMBS loan requests were only $13 billion in that same nine-month period. In addition, about half of TALF borrowers overall, and more than half of all types of borrowers except mutual funds and REITs, invested only in new-issue ABS and eschewed the CMBS program altogether (Table 6).

The low participation in the CMBS program is somewhat surprising, in addition to being inconsistent with risk-shifting behavior. Around 1,350 CMBS were putatively eligible collateral for loans in TALF 1.0, compared with only 100 new-issue ABS. The significant spread between the CMBS yield and the TALF loan rate also suggested that financing a CMBS with TALF loan was a profitable investment, even in the last subscription.

One possible explanation is that investing in CMBS required more expertise. A triple-A rating was a meaningful indicator of high credit quality for new-issue ABS, given the significantly tighter standards that the rating agencies imposed after the global financial crisis, but was not for legacy CMBS. However, even some funds managed by firms that had considerable expertise in CMBS did not participate. Another explanation is timing: the funding pressures faced by some investors, and thus the impetus to borrow from TALF, may have eased by the time the CMBS program launched in July 2009. However, even the

majority of TALF-only funds—whose participation was concentrated in the months when the CMBS program was operational—eschewed the CMBS program.

Instead, the possibility that a loan request could be denied appears to have been the major reason why investors had less enthusiasm for the CMBS program. A rejection meant that the investor would have to line up alternative long-term financing or sell the security at a potential loss. As we show in the next subsection, the prices of rejected CMBS generally fell. In contrast, investors did not face any funding uncertainty in the new-issue ABS program because the collateral review occurred before the ABS was issued.

Such rejections were particularly problematic for many of the TALF-only funds. The manager's investment options were governed by the fund's PPM. If the fund lost money on an investment because of a risk that was not disclosed in the PPM, the investment manager could be forced to obtain bridge financing and buy the investment out of the fund. Although a PPM can be modified, it requires obtaining the consent of all investors in the fund. The PPMs for the first batch of TALF-only funds did not envision or disclose rejection risk, since the terms of the legacy CMBS program were not announced until May 19, 2009, well after many of the managers of the TALF-only funds had put together their governing documents and recruited investors.[35]

Rejection risk was an acute issue for potential borrowers because TALF 1.0 borrowers had difficulty predicting whether FRBNY would reject a CUSIP. FRBNY provided broad guidance on its process, stating for example that "CMBS that represent interests in pools with high cumulative losses, a high percentage

[35] We reviewed some PPMs that were obtained as part of the FRBNY's counterparty risk assessment. That review indicated that only funds that were created in the late summer 2009 or later disclosed the risks associated with the CMBS program. The first wave of TALF funds also commonly described their investment parameters as encompassing TALF eligible securities, whereas at least one later PPM stated that the fund is allowed to invest in "assets that the Adviser *believes* are eligible to be financed through TALF" (emphasis added).

of delinquent loans, loans in special servicing or loans on servicer watch lists or a high percentage of subordinate-priority loans may be rejected. The New York Fed may consider in its decisions forecasts of pool level losses under various stress scenarios."[36] The CMBS that FRBNY rejected were in line with that guidance: rejected CMBS had a larger share of loans that were 90 days delinquent or in special servicing (Table 7).[37] FRBNY's forecasts also turned out to have predictive power: nearly 14 percent of the CMBS that it rejected were ultimately downgraded, on average 16 months after the rejection. In contrast, only 3 percent of the accepted CMBS were downgraded, on average 30 months after the acceptance.

Investors also observed early on that loan requests collateralized by longer-maturity CMBS seemed more likely to be rejected.[38] As shown in Table 5, the median WAL for rejected CUSIPs was 5.7 years, compared with 2.8 years for accepted CUSIPs.

Nonetheless, uncertainty about whether bonds would be accepted weighed on participation at the first subscription.[39] After FRBNY rejected only one CUSIP at the July 2009 subscription, three at the August 2009 subscription, and none at the September 2009 subscription, investors became more confident that they understood FRBNY's risk parameters (Figure 9).[40] The subsequent October 2009 subscription had the largest number of participants (43 borrowers) of any month in the program.

In the October 2009 subscription, however, FRBNY surprised the market by rejecting five CUSIPs, including the A3 tranche of a CMBS whose A4 tranche was accepted at both the August and September subscriptions.[41] At the next subscription in November 2009, only 28 borrowers participated. FRBNY

[36] TALF Frequently Asked Questions, June 23, 2009, available at https://www.newyorkfed.org/markets/talf_cmbs_faq_090623.html.
[37] We thank Jeremy Brizzi at the Federal Reserve Bank of Philadelphia for this analysis which is based on data from Intex Solutions, a leading provider of information and valuation software on structured finance securities.
[38] "Buyers Gripe About TALF Loans," Commercial Mortgage Alert, September 25, 2009.
[39] Commercial Mortgage Alert, July 10, 2009.
[40] "TALF Loan Rejections Befuddle Investors," Commercial Mortgage Alert, October 30, 2009.
[41] CMBS generally have multiple AAA tranches that differ in the timing of when the investor receives various cash flows. Investors in an A3 tranche would get their money back sooner than investors in an A4 tranche.

deepened the confusion at that subscription by rejecting three CUSIPs that had been accepted in previous subscriptions; two of these had been accepted the previous month. This confusion was never resolved, and in fact in the remaining months of the program FRBNY rejected another nine CUSIPs that had been accepted at earlier subscriptions. In January 2010, one news story was headlined "Fickle Fed Irking TALF Applicants",[42] while a Financial Times columnist observed "The Fed's Talf reasoning is always a bit mysterious… it looks like the Fed's Talf-thinking doesn't make much sense to bond investors either" (Alloway, 2010).

The uncertainty around which CUSIPs would be accepted had large and lasting effects on take-up and the composition of collateral. The number of borrowers fell to a low of 13 in February 2010 and 16 in March 2010. Meanwhile, investors appeared to try to manage rejection risk by submitting as collateral CUSIPs that were accepted at earlier subscriptions. In the second subscription in August 2009, 11 out of the 84 CUSIPS submitted had been accepted in the previous July subscription. Since 1,350 CUSIPs were putatively eligible, this share seems higher than chance alone would predict. The share of previously accepted CUSIPs was around 40 percent in the September and October 2009 subscriptions. After rejection became significantly more salient in the October 2009 subscription, the share was 63 to 70 percent in the next four subscriptions. The borrowers who remained in the program in the last couple months appeared to either have a greater tolerance for risk or found rejection to be relatively low cost. Although the share of borrowers who had at least one loan request rejected never exceeded 14 percent in all of 2009, it was 31 percent in January 2010, 23 percent in February 2010, and 38 percent in March 2010. [43]

To explore whether rejection risk appeared to affect the behavior of some investors more than others, we examine patterns by type of investor after the October 2009 rejections, when rejection risk became particularly salient to borrowers (Table 8). Hedge funds and REITs were most spooked by the rejections:

[42] "Fickle Fed Irking TALF Applicants," Commercial Mortgage Alert, January 29, 2010
[43] We report loan rejections by subscription in Appendix Table A3.

the number of these firms that borrowed, and the dollar volume of loans that they requested, was smaller in November 2009 than in October 2009, and the share of loan requests collateralized by previously accepted CMBS rose considerably. Meanwhile, the behavior of mutual funds and private individuals was roughly unchanged in November 2009 relative to October 2009.

TALF-only funds also saw a drop in borrowing in November, and the drop off appears to have been tied to whether their PPMs disclosed rejection risk. Of the 16 October borrowers, we have the PPMs for 11 and so can divide these funds into 3 whose PPMs disclosed rejection risk and 8 whose PPMs did not. All three of the funds that disclosed rejection risk continued participating in November, and the share of their loan requests that were collateralized by previously accepted CMBS remained less than 50 percent.

In contrast, four of the eight TALF-only funds that did not disclose rejection risk stopped participating in the CMBS program entirely after the October subscription. The other four became conservative in their investment behavior. In September and October 2009, about half of their loan requests were collateralized by previously accepted CMBS; from November on, that share rose to about 80 percent.

Although REITs and hedge funds appeared to be relatively risk averse immediately after the October 2009 rejections, by the end of the program they appeared to have regained their taste for risk. In the previous section, we supported this point by showing that the WALs of the CMBS that collateralized REIT and hedge funds loan requests were much higher in 2010 than in 2009. We also see this from their loan rejections. The number of submitted CUSIPs that were rejected rose sharply from 5 in February 2010 to 19 in March 2010 (Figure 7). The spike was driven mainly by submissions from hedge funds and REITs, although other borrower types also submitted CUSIPs that were rejected. Although no REIT had a rejected loan request in 2009, five out of the six REITs that borrowed from TALF in 2010 had one or more request rejected from January to March 2010. This share was considerably higher than for any

other type of borrower. One of these REITs even submitted two loan requests during this period that were collateralized by CUSIPs that had been rejected in earlier subscriptions.

REITs and hedge funds may have become more comfortable with the risk of loan rejections, and thus more willing to attempt to pledge risky collateral, as they became more confident in their outside market funding in 2010. In the REITs' year-end 2009 10-Ks, financing conditions were generally still depicted as tight; one REIT noted that "Currently, we have no repurchase agreements or bank credit facilities in place, and there can be no assurance that we will be able to obtain one or more such facilities on favorable terms" and three noted that "Under current market conditions, structured financing arrangements are generally unavailable," and that without this longer-term take-out financing in place, lenders were hesitant about extending short-term credit. The tone of the filings changed by their March 2010 10-Q, when two REITs reported having obtained repo facilities with money-center banks. The sustained recovery in REIT stock prices by early 2010 likely also contributed to their ability to obtain outside financing.[44]

In TALF 2.0, rejection risk did not leave any noticeable imprint in CMBS participation patterns, although as in TALF 1.0 hedge funds largely avoided the legacy CMBS program (Table 6). However, CMBS underwriting was much stronger in the years before the pandemic than before the global financial crisis, and investors also had more confidence in the rating agency methodology in 2020 than in 2009. As one indicator of the higher quality of CMBS in 2020, no CMBS were rejected in TALF 2.0. Investors also had more stable funding options outside of TALF, and asset managers who structured TALF-only funds learned from the TALF 1.0 experience and wrote their PPMs to encompass rejection risk.

[44] By March 2010, mortgage REIT prices had been rising for more than a year, after falling by 20 percent year-over-year in March 2009 and 47 percent in March 2008.

So while the generally low level of participation in the CMBS program in TALF 1.0 is not consistent with investors shifting risk to the government, participation and risk shifting attempts did pick up as market conditions normalized, particularly among hedge funds and REITs. This fact highlights that when investors are less dependent on the government for funding, they have an incentive to try to shift risk. In the case of TALF, the program design features contained that risk, although at the cost of providing somewhat less liquidity support to the CMBS market.

Evidence from repricing of rejected securities

To buttress our argument that rejection risk was less painful in the later months of TALF 1.0, we look at the spread changes on rejected CMBS in a short window centered around each rejection announcement. CMBS spreads could rise after a rejection announcement for a couple reasons. First, with the option of TALF financing removed, the security was less liquid, and the expected return from holding it was lower. We would expect this effect to diminish as markets recovered and made available other financing options. Second, the rejection provided information to the market about the credit quality of the CMBS. Third, the prospective TALF borrower might need to sell the security after rejection, and this forced sale could increase the spreads, especially in periods of stressed financial conditions. Although it is unclear whether this sale would occur within the time-period covered by our event windows, market participants might have anticipated that such a sale was forthcoming.

A similar event study in Campbell et al. (2011) compares the change in the spread on the rejected CUSIP with the change at the same time in an equally weighted average of spreads on all CMBS that met the broad TALF parameters. That design controls for market-wide moves in CMBS spreads, but does not control for the fact that some securities inherently have more price volatility than others. Longer-WAL securities, for example, have more price volatility than shorter-WAL securities. Further, as shown in

Campbell et al. (2011), the CMBS submitted as TALF collateral were not randomly chosen from the list of TALF-eligible securities, but rather tended to have higher spreads and more price volatility.

In order to control for both these market-wide and security specific factors, we construct a full panel with daily spread data from Trepp for the 294 CUSIPs submitted as collateral for TALF loan requests from July 1, 2009 to March 31, 2010 (191 trading days). This setup allows us to control for trading-day fixed effects and CUSIP fixed characteristics and thus both for market-wide changes in CMBS spreads and CUSIP-specific factors.

We estimate the following regression:

$$\Delta Spread_{it} = \beta_1 Rejected_{it} + \theta_i + \alpha_t + \epsilon_{it}$$

where $\Delta Spread_{it}$ is the change in the spread of CUSIP *i* during a 5-, 7-, 9-, or 11- trading-day window centered on date *t*. $Rejected_{it}$ is an indicator variable that is equal to 1 on the trading day on which the CUSIP rejection was announced, θ_i are CUSIP fixed effects and α_t are trading-day fixed effects. In the second set of regressions, $Rejected_{it}$ is interacted with indicator variables for the different subscriptions.

In the full sample, we find that spreads increased by 10 basis points within a 5-day window around the rejection and by 26 basis points within an 11-day window (Table 9, Panel A, columns 1 and 4). In general, the spread response to rejection increases as we broaden the event window, but we find no spread reaction when we narrow the event window to 3 days (results not shown). Because individual CMBS do not necessarily trade every day, it often takes a couple days for new transactions to occur and inform the spread estimates. We also explored whether the spread widening was larger for CMBS held by investors that might be forced to sell a rejected CMBS, but the sample size was too small to draw firm conclusions.

The spread response was largest at the first subscription in July 2009—61 to 102 basis points, depending on the window—and then decreased over time to 2 to 7 basis points at the February 2010 subscription (Table 7, Panel B, column 1) before widening somewhat to 4 to 21 basis points in March 2009.

Incongruously, the spreads on rejected CMBS tightened around the December subscription; our best explanation is that spreads can be volatile in the typically light trading activity around the holidays and at year-end (the rejections were announced on December 18). Our results are broadly in line with those in Campbell et al. (2011), which found a 5 basis point spread widening overall for the five-day window around the rejection and a 99 basis point widening at the July subscription, along with the same incongruous spread tightening in December. Our results are also in line with Ashcraft et al. (2011), who found that the effect of rejection on CMBS spreads was larger during the July–September 2009 subscriptions than in the later subscriptions.

We interpret the decreasing reaction over time to CMBS rejection as evidence that spreads widened primarily because market participants placed a premium on the liquidity associated with TALF eligibility. The TALF liquidity premium decreased as outside funding became more available and the CMBS market recovered. However, the fact that the spread increase was still positive, albeit small, at the last (March) subscription—when the option of future TALF financing was gone—suggests that market participants also took the FRBNY decision as a signal of credit quality. The results also indicate that rejection risk may become less of a deterrent to submitting low-quality collateral as market conditions recover, and so at such a time central banks may need to be especially attentive to their collateral review programs.[45]

5. Discussion and Concluding Remarks

Our study highlights how the institutional constraints of different types of nonbank investors affect whether their investment behavior aligns with the central bank's goals. Specifically, we find that investors with flexible investment parameters are more likely to participate early in a program and thereby help stabilize markets. Investors who are participating in the program primarily because of

[45] Duygan-Bump et al. (2013) find similar dynamics for the Asset-backed Commercial Paper Money Market Mutual Fund Liquidity Facility during the global financial crisis.

capital gains are more likely to exit the program when market conditions normalize. And investors with stable long-term funding are more likely to invest in long-maturity securities. These findings suggest that liquidity facilities that are addressing multiple objectives might be well-served by allowing a broad range of entities to participate.

We also find that the extent to which investors attempt to shift risk to the government depends on whether the investor views the government as a crucial source of funding. When hedge funds and REITs were unable to obtain funding from the private market that was comparable to the TALF funding, they were conservative in the CMBS that they submitted as potential collateral for a TALF loan. When private funding became more abundant, they submitted riskier collateral. Nonetheless, TALF's design successfully mitigated the risks associated with this behavior, and the government did not incur any losses in either program.

This raises the question of whether the government should have made more use of nonbank institutions to support markets during the past two crises. Our answer depends, in part, on whether the market under strain retained enough liquidity to enable the government to ascertain fair pricing. The Fed purchased bonds from investment-grade companies and equity shares of bond exchange-traded funds directly in the Secondary Market Corporate Credit Facility (SMCCF) launched in 2020, a program with a far simpler structure than TALF.[46] As one gauge of the SMCCF's simplicity relative to TALF, the Frequently Asked Questions document for TALF ran more than 21,000 words, compared with about 1,500 words for the Secondary Market Corporate Credit Facility. However, in the SMCCF, the government had to outsource purchase and pricing decisions to a financial institution, which seems reasonable in relatively liquid markets such as those for investment-grade corporate bonds and public equities, where market values

[46] The companies needed to be rated investment-grade in March 2020, but their bonds remained eligible for the SMCCF if the company was downgraded before the purchase and not to below BB-, so only one letter rating below investment-grade.

are easily determined in typical times and even during the March 2020 strains. In markets such as ABS, which are fairly illiquid even in typical times, the government may prefer to leave the price discovery process to the private market by lending to investors who in turn will invest in the targeted asset class, though with appropriate safeguards.[47]

We also note that a program that harnesses nonbank investors may spur innovation among these firms, and that the consequences of this innovation may be difficult to predict. For example, in the case of TALF, market participants created TALF-only funds, a new variant of private capital funds, for the sole purpose of borrowing from TALF. These funds had some characteristics that influenced their interaction with the program. First, the funds were inflexible—their tight investment guidelines made it difficult for many funds to participate in the CMBS program in TALF 1.0 when the rules for that program proved to be different than for the ABS program. Second, the fact that their capital could only be deployed for TALF-related investments gave them an incentive to keep participating even when the economics of TALF became less attractive. Investors were presumably willing to accept these shortcomings, rather than give fund managers more discretion, because they wanted to ensure that their capital was deployed only for TALF-related investment strategies. Nonetheless, the somewhat surprising end result was that investors primarily used an inflexible structure to borrow from a crisis facility, where underlying market conditions, by definition, are volatile.

[47] Nonbank investors may be less needed for alleviating strains in short-term credit markets, which seem to have been well addressed in both crises by making short term (up to 30 day) loans to primary dealers, as in the Primary Dealer Credit Facility, or by making somewhat longer-maturity loans (up to a year) to banks, as in the Money Market Lending Facility.

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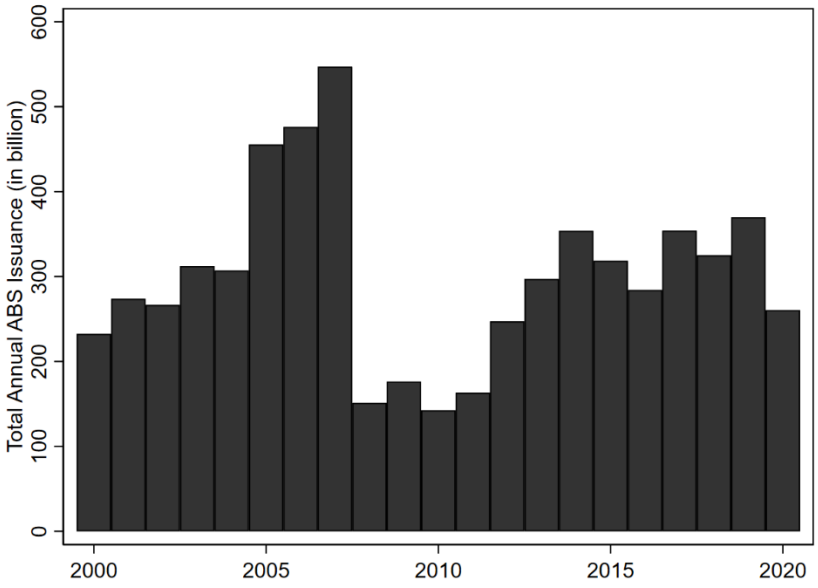
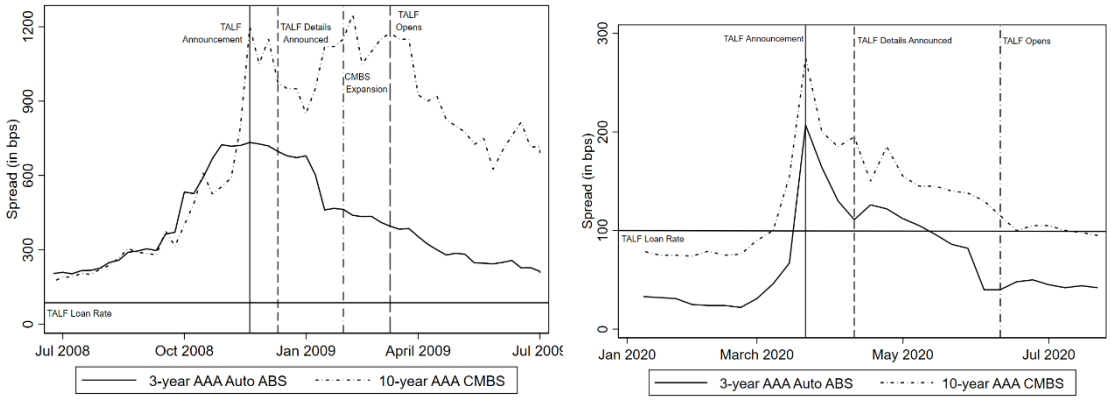
Figures and Tables

Figure 1. Total Issuance in TALF-eligible ABS Categories (in $ billion)



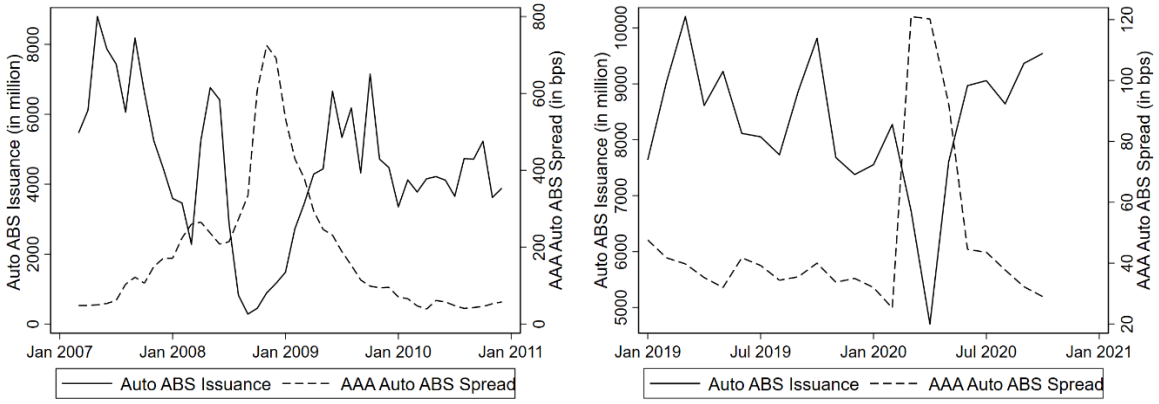
Source. SIFMA.
Note: Includes non-agency CMBS and consumer and small-business ABS (auto, credit card, student loan, equipment, and "other" categories, as defined by SIFMA). Some very small ABS categories included in "other" ABS were not TALF-eligible. CLOs are not included because they were not TALF-eligible in TALF 1.0.

Figure 2. ABS Spreads around TALF Events



Source. Courtesy J.P. Morgan Chase & Co., Copyright 2021.
Note. Spreads are relative to comparable-maturity swaps.

Figure 3. Auto ABS Issuance and Spreads 2007-10 and 2019-20

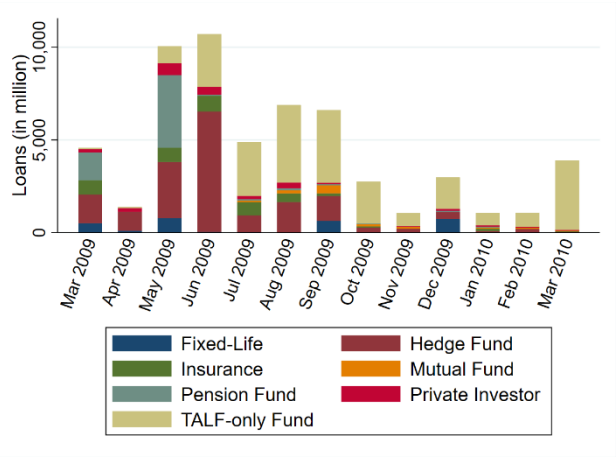


Source. Courtesy J.P. Morgan Chase & Co., Copyright 2021, and Bloomberg.
Note: Spreads shown are for three-year auto ABS over comparable-maturity swaps. Auto ABS issuance is a three-month moving average.

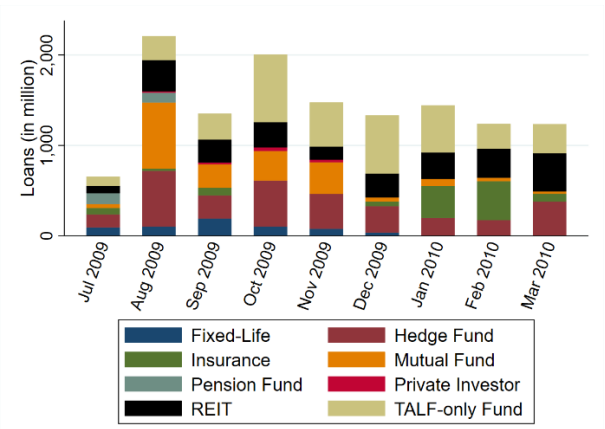
Figure 4. Take-up by Subscription Date and Investor Type in TALF 1.0 and TALF 2.0

TALF 1.0

ABS

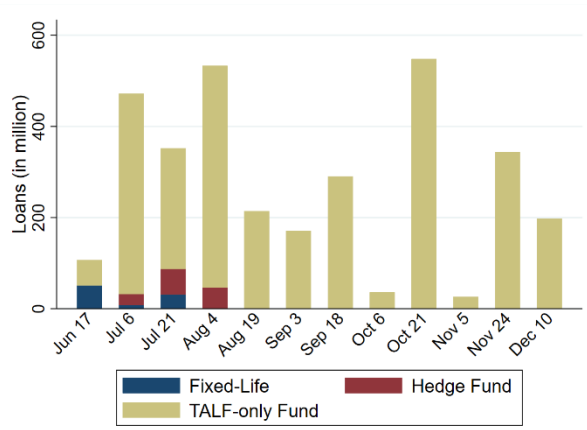


CMBS

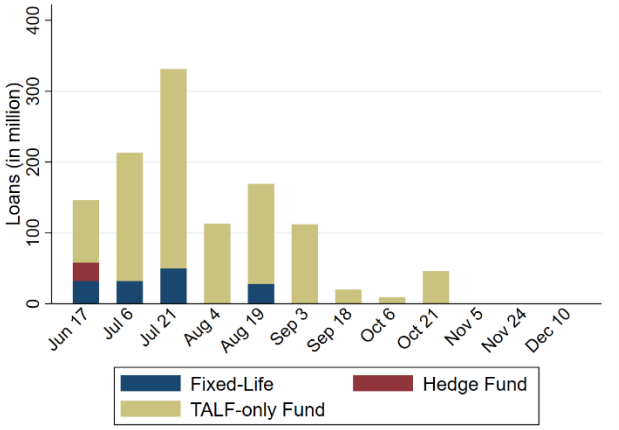


TALF 2.0

ABS



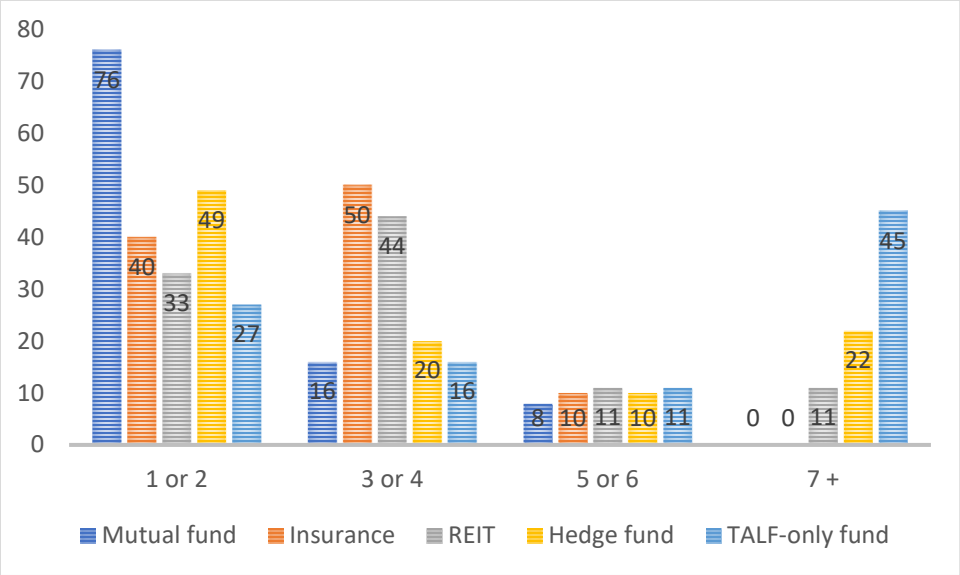
CMBS



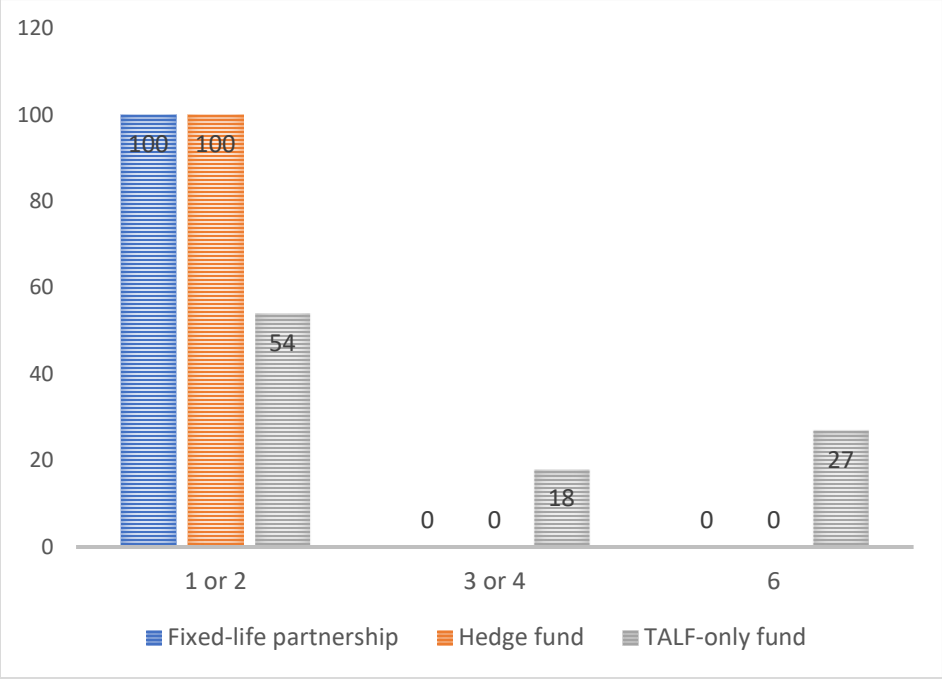
Note. Bars represent the dollar amount of loan requests at each subscription by type of borrower. Banks are excluded from the TALF 1.0 tabulations because of their small sample size.
Source. Authors' calculations, public data disclosures on Federal Reserve website, and internal FRBNY data.

Figure 5: Distribution of Number of Months in which Investors Requested Loans

TALF 1.0



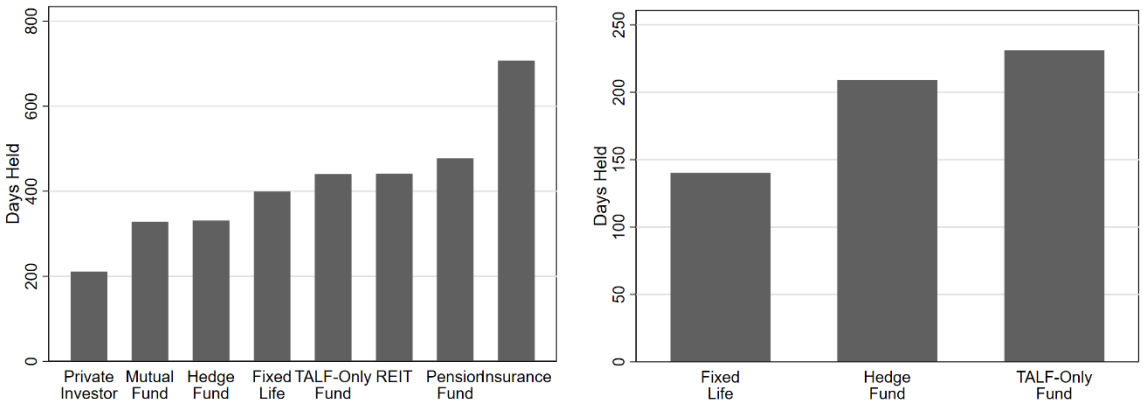
TALF 2.0



Source. Authors' calculations, public data disclosures on Federal Reserve website, and internal FRBNY data. Banks are excluded from the TALF 1.0 tabulations because of the small sample size.

Figure 6: Median Days Held by Investor Type

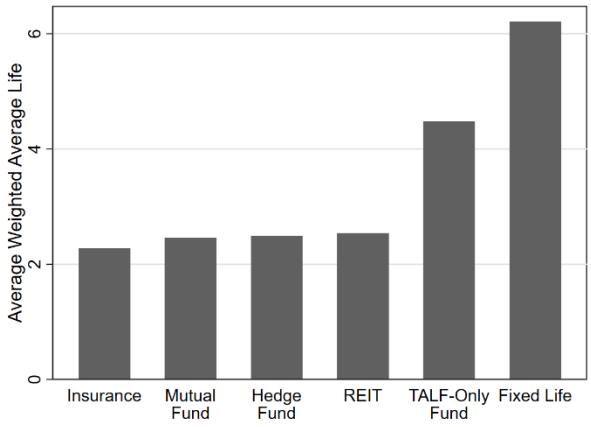
TALF 1.0 **TALF 2.0**



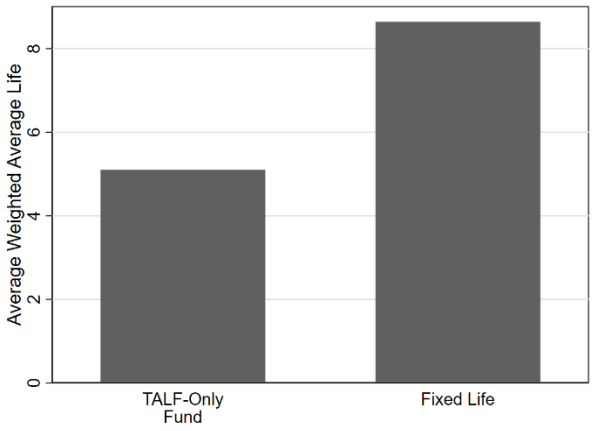
Source. Authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.
Note. Statistics are weighted by loan balance. Table 3, column 3 shows whether the differences across investors are statistically significant.

Figure 7: Median Weighted Average Life of CMBS Collateral by Investor Type

a) TALF 1.0

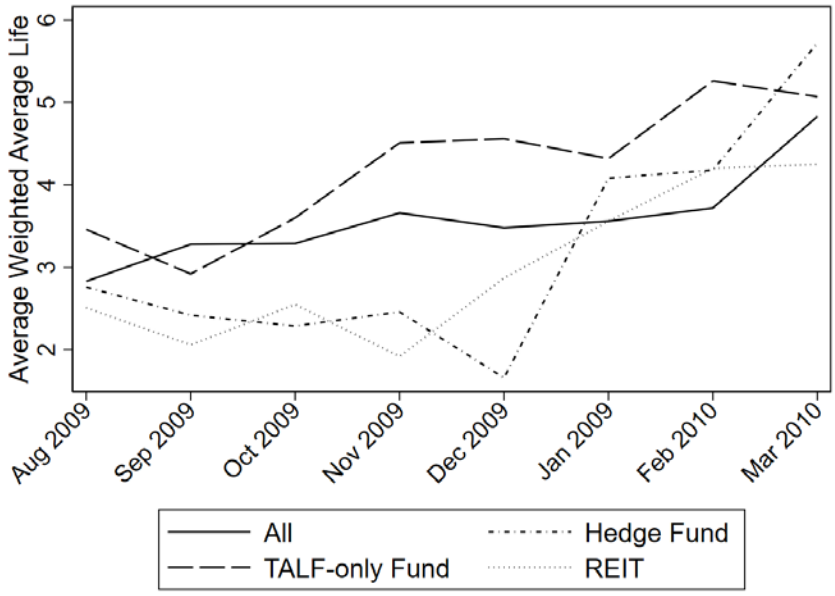


b) TALF 2.0



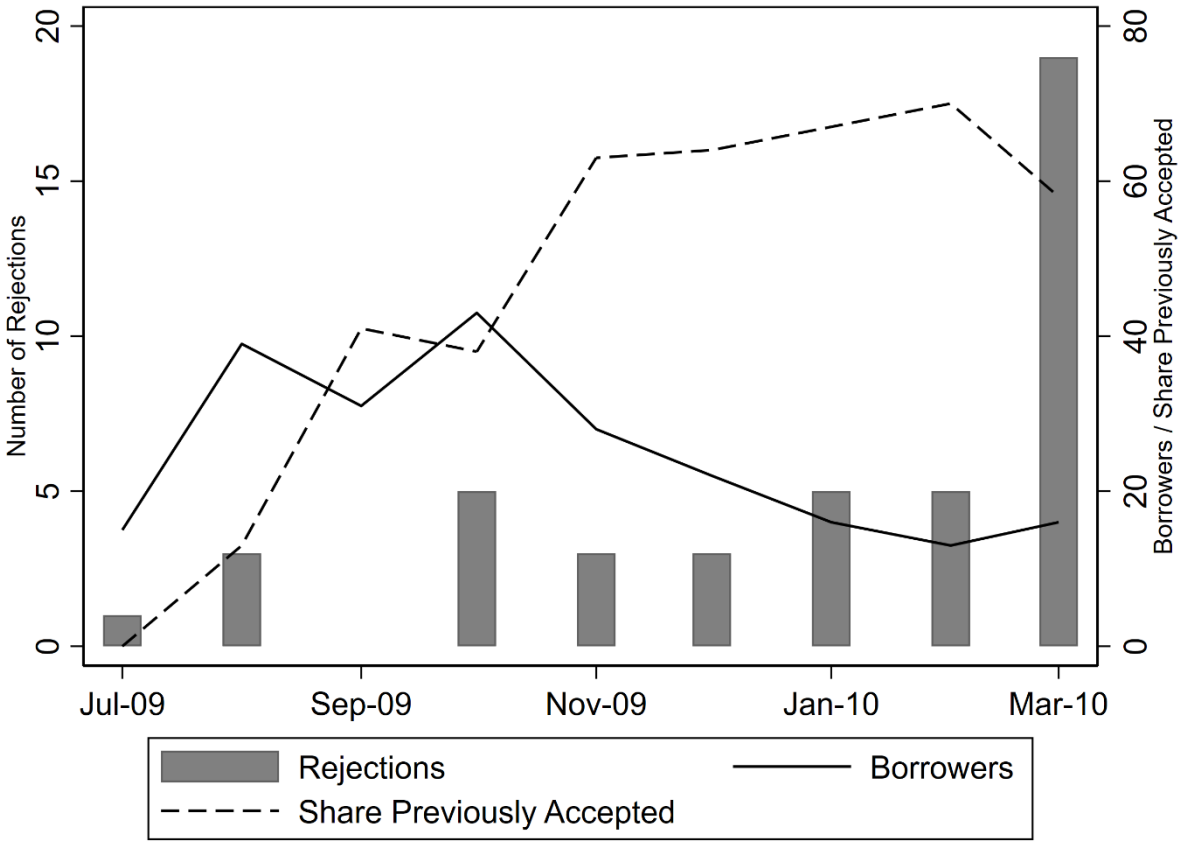
Note. Sample includes loan requests that were rejected by FRBNY because the CMBS collateral did not pass FRBNY's risk screening process. Statistics are weighted by loan balance.
Source. Trepp (WAL for TALF 1.0), Bloomberg (WAL for TALF 2.0), authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Figure 8. WAL of CMBS Collateral for Selected Investors during TALF 1.0



Note. Average WAL is weighted by the loan balance.
Source. Trepp, authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Figure 9: Number of CUSIP Rejections and CMBS Borrowers, and Share of Loan Requests Collateralized by a Previously Accepted CUSIPs, TALF 1.0



Note. Share previously accepted is the share of CUSIPs proposed as collateral for new loan requests that had been accepted as collateral in earlier subscriptions.
Source. Authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Table 1. TALF Borrower Base

TALF Borrowers	Eligible Investors	Funding	Economic Incentives	TALF-Relevant Regulatory Constraints
Traditional ABS Investors				
Insurance companies	Business purposes	Mostly long-term policyholder liabilities, funding agreement-backed securities, FHLB advances, repo	Tend to buy and hold ABS to generate stable income.	
Pension funds	Business purposes	Mostly long-term pension liabilities, limited leverage	Tend to buy and hold ABS to generate stable income.	
Mutual funds (mutual and closed-end funds)	All investors	Mutual funds are dependent on fund flows; typically, limited leverage[48]	Over-riding objective of broad diversification limits their ability to overweight any particular asset. Mutual funds can face redemption pressure.	Limited ability to use leverage (1940 Investment Act)
REITs	All investors	Equity capital, securitization proceeds, high leverage (repo, bank lines of credit and term lending facilities)	Their investor base prefers high dividend yields; REITs tend to emphasize income over capital gains in their investment behavior.	Can only invest in assets related to real estate
Banks	Business purposes	Mix of stable deposits and short-term funding, high leverage		

[48] Some mutual funds take on leverage through their derivatives activity; for a discussion, see Deli et al. (2015).

Opportunistic ABS Investors			
TALF-only investment vehicles (established by hedge funds or other asset managers)	Accredited investors	Locked-in long-term capital (limited partnership interests), limited leverage (outside of TALF loans)	Investors cannot withdraw funds. Governing documents describe investment parameters of the fund. The general partner must return the investors' capital if she cannot find investment opportunities consistent with the fund parameters. Compensation incentivizes seeking outsized gains rather than long-term income.
Fixed-life partnerships	Accredited investors	Locked-in long-term capital (limited partnership interests), limited leverage	Investors cannot withdraw funds. Governing documents describe investment parameters of the fund. The general partner must return the investors' capital if she cannot find investment opportunities consistent with the fund parameters. Compensation incentivizes seeking outsized gains rather than long-term income.
Hedge funds	Accredited investors	Long-term capital (limited partnership interests), high leverage (repo, margin, and bank credit facilities)	Investors' ability to withdraw money (subject to some limitations) means that funds face redemption pressures. Compensation incentivizes seeking outsized gains rather than long-term income.
Wealthy individuals	Family members	Personal wealth, limited leverage	Seeking high Sharpe-ratio investments.

Table 2. TALF Participation by Investor Type

TALF Borrowers	Number of Borrowers	Percent	Requested Number of Loans	Percent	Loan Amount (in millions)	Percent
TALF 1.0						
Traditional ABS Investors						
Insurance companies	10	6	119	6	5,068	7
Pension funds	6	4	49	3	6,114	8
Mutual funds	25	15	136	7	2,926	4
REITs	9	5	125	7	2,401	3
Banks	3	2	8	0	606	1
Opportunistic ABS Investors						
Hedge fund TALF-only Funds	18	11	341	18	8,536	12
Other asset manager TALF-only funds	26	16	420	22	19,855	28
Fixed-life partnerships	8	5	62	3	3,488	5
Hedge funds	41	25	536	28	20,628	29
Private individuals	21	13	123	6	2,399	3
Total	167	100	1,919	100	72,021	100
TALF 2.0						
Opportunistic ABS Investors						
Hedge fund TALF-only Funds	6	30	149	68	3,057	69
Other asset manager TALF-only funds	5	25	43	20	1,008	23
Fixed-life partnerships	4	20	20	9	231	5
Hedge funds	5	25	8	4	153	3
Total	20	100	220	100	4,449	100

Note. The TALF 1.0 loan request numbers include about $1 billion in loans denied by FRBNY because the CMBS collateral was determined too risky.

Source. Authors' calculations, public data disclosures on Federal Reserve website, and internal FRBNY data.

Table 3. Days TALF Loan Was Held, By Type of Borrower, TALF 1.0

	(1) OLS	(2) OLS	(3) CUSIP Fixed Effects	(4) Median Regression	(5) Median Regression
Hedge fund	12.81	8.773	91.75*	-2	19.00
	(90.47)	(89.01)	(52.75)	(130.7)	(32.50)
Fixed-life	48.46	59.48	139.1**	66	76.00
	(75.46)	(91.69)	(60.98)	(130.3)	(56.60)
TALF-only fund	122.6	51.41	150.5**	107	65.00**
	(80.18)	(92.58)	(63.05)	(126.2)	(26.94)
Pension fund	124.2*	174.9*	484.8***	144	172.0
	(69.49)	(96.86)	(85.26)	(.)	(511.3)
Insurance	282.8*	296.6**	455.5***	374*	373.0***
	(150.1)	(137.6)	(110.6)	(193.9)	(132.8)
REIT	106.5	117.2	262.8***	108	194.0***
	(92.47)	(103.4)	(70.47)	(120.6)	(42.08)
Private individuals	15.04	70.24	162.9	-122	19
	(97.29)	(112.4)	(100.2)	(122.3)	(45.64)
Time FE	No	Yes	No	No	Yes
WAL Bucket * Rate Type FE	No	Yes	No	No	Yes
CUSIP FE	No	No	Yes	No	No
Observations	2338	2338	2338	2338	2338
R^2/ Pseudo R^2	0.06	0.30	0.52	0.05	0.23

Notes. Omitted borrower type is mutual fund. Regressions are weighted by the dollar amount of each loan. WAL buckets are less than 1 year, 1-2 years, 2-3 years, 3-4 years, 4-5 years, 5-6 years and greater than 6 years. The buckets are interacted with indicators for fixed and floating rate ABS. Standard errors in parentheses are robust and clustered by borrower in the OLS and fixed-effect specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source. Bloomberg (WAL for ABS), Trepp (WAL for CMBS), authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Table 4: Dollar-weighted Yields on CMBS Collateral by Investor Type

TALF Borrower	25th Percentile	Median	75th Percentile	Mean	N
TALF 1.0					
Insurance	3.57	4.03	4.32	4.21	69
Mutual fund	4.48	5.09	5.60	5.10	129
REIT	4.21	4.67	5.06	4.68	184
TALF-only fund	4.43	5.30	6.06	5.26	252
Hedge fund	4.14	4.85	5.89	4.94	224
Fixed-life	5.69	6.29	7.27	6.19	37
All	4.24	4.90	5.86	5.01	900
TALF 2.0					
TALF-only fund	1.35	1.45	1.65	1.47	91
Fixed-life	1.54	1.67	1.73	1.65	19
All	1.37	1.49	1.65	1.48	112

Note. Sample includes loan requests that were rejected by FRBNY because the CMBS collateral did not pass FRBNY's risk screening process. Hedge funds are dropped from the TALF 2.0 part of the table because they only requested two loans collateralized by CMBS. Some loan requests are split into multiple observations in the public data disclosures because the borrower acquired the collateral in multiple transactions. As a result, the "N" in the table is a bit larger than the number of loan requests. Statistics are weighted by loan balance.
Source. Trepp (yield for TALF 1.0), Bloomberg (yield for TALF 2.0), authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Table 5. Yield on CMBS Loan Request, By Type of Borrower, Includes Rejections, TALF 1.0

	(1) OLS	(2) OLS	(3) OLS	(4) Median Regression
Hedge fund	0.73	0.32*	0.25	0.08
	(0.51)	(0.18)	(0.17)	(0.09)
TALF-only fund	1.06***	0.17	0.18	0.07
	(0.38)	(0.12)	(0.13)	(0.07)
Mutual fund	0.90**	0.12	0.067	0.11
	(0.37)	(0.13)	(0.13)	(0.09)
Fixed-life partnership	1.98***	0.45***	0.40***	0.47***
	(0.37)	(0.15)	(0.15)	(0.08)
REIT	0.48	0.11	0.10	0.03
	(0.38)	(0.11)	(0.12)	(0.06)
Date FE	No	Yes	Yes	Yes
WAL bucket FE	No	Yes	Yes	Yes
Weighted by loan balance	Yes	Yes	No	Yes
Observations	895	895	895	895
R^2 / Psuedo R^2	0.122	0.785	0.792	0.58

Notes. Includes loan requests that were rejected by FRBNY. Omitted borrower type is insurance companies. Loan requests submitted by pension companies and private individuals are omitted from the regressions because of small sample size. WAL buckets (in years) are 0-1; 1-2; 2-3; 3-4; 4-5; 5-6; and more than 6. Standard errors are robust, clustered by the borrower, and shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source. Trepp, authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Table 6. Borrowers by New-Issue ABS and Legacy CMBS Program Participation

TALF Borrowers	ABS Only	CBMS Only	Both	Total
		TALF 1.0		
Insurance companies	6	2	2	10
Pension funds	5	-	1	6
Mutual funds	1	14	10	25
REITs	-	9	-	9
TALF-only funds	25	3	16	44
Fixed-life partnerships	4	1	3	8
Hedge funds	25	7	9	41
Private individuals	18	1	2	21
All	84	37	43	164
		TALF 2.0		
TALF-only funds	2	4	5	11
Fixed-life partnerships	1	2	1	4
Hedge funds	3	1	1	5
All	6	7	7	20

Source. Authors' calculations, public data disclosures on Federal Reserve website, and internal FRBNY data. Banks are excluded from the table for TALF 1.0 because of the small sample size.

Table 7. TALF 1.0 CMBS Characteristics and Outcomes

	Accepted	Rejected
CUSIP Count	265	41
Average 90+ Days Delinquent at Subscription	2.36%	3.54%
Average Special Servicing at Subscription	7.81%	8.74%
% of Total Downgraded (lifetime)	2.64%	14.63%
Average Months to First Downgrade	30	16
WAL, 25th percentile	2.02	4.25
WAL, Median	2.80	5.68
WAL, 75th percentile	5.19	6.51

Note. For CUSIPs that were accepted or rejected multiple times, statistics correspond to the first acceptance or rejection.

Source. Trepp (for WAL). Jeremy Brizzi at the Federal Reserve Bank of Philadelphia based on data from Intex Solutions (for delinquency statistics).

Table 8: Change in CMBS Participation by Investor Type, October-November 2009

	Borrowers (number)		Loan requests ($million)		CUSIP accepted before (percent)	
	Oct 2009	Nov 2009	Oct 2009	Nov 2009	Oct 2009	Nov 2009
Mutual fund	7	7	327	351	60	76
Private individuals	2	2	39	29	100	100
Hedge fund	11	8	509	384	35	71
REIT	4	1	281	145	21	56
Fixed-life partnership	3	1	102	78	33	50
TALF-only fund	16	11	746	488	48	65
PPM allows for Rejection	3	3	119	97	44	43
PPM doesn't allow for rejection	8	4	448	183	44	100
All	43	30	2,005	1,475	43	68

Note. No insurance companies or pension funds participated in the CMBS program in October or November 2009.
Source. Authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Table 9. Spread Change after Loan Rejection

Panel A: All subscriptions

	5 day window	7 day window	9 day window	11 day window
	(1)	(2)	(3)	(4)
Rejected	10.03**	14.59***	23.92***	25.53***
	(4.32)	(4.10)	(6.64)	(7.77)
Time FE	Yes	Yes	Yes	Yes
CUSIP FE	Yes	Yes	Yes	Yes
Observations	54,126	53,830	53,534	53,238
R^2	0.39	0.44	0.46	0.47

Panel B: With Subscription Date Interactions

	(1)	(2)	(3)	(4)
Rejected – Jul 09	84.96***	61.15***	90.14***	102.31***
	(1.66)	(3.00)	(2.51)	(3.37)
Rejected – Aug 09	32.51***	21.68***	75.45***	80.32***
	(2.26)	(1.80)	(3.06)	(3.27)
Rejected – Oct 09	17.98***	17.20***	20.90***	31.31***
	(1.83)	(1.40)	(2.23)	(3.68)
Rejected – Nov 09	17.32***	24.32***	62.47***	78.29***
	(2.29)	(7.06)	(3.37)	(4.02)
Rejected – Dec 09	-18.08***	-28.557***	-29.58***	-27.35***
	(2.07)	(2.43)	(2.11)	(2.23)
Rejected – Jan 10	14.65***	10.07*	18.55***	17.24***
	(1.46)	(5.39)	(1.53)	(2.50)
Rejected – Feb 10	1.78	6.67***	7.46***	6.73**
	(1.10)	(1.06)	(1.11)	(3.16)
Rejected – Mar 10	4.36***	19.08***	21.00***	17.97***
	(1.65)	(2.64)	(2.68)	(2.66)
Time FE	Yes	Yes	Yes	Yes
CUSIP FE	Yes	Yes	Yes	Yes
Observations	54,126	53,844	53,534	53,238
R^2	0.39	0.44	0.46	0.37

Note. The dependent variable is $\Delta Spread_{it}$---the change in the spread of CUSIP *i* during a window indicated in each column centered on date t. Standard errors clustered are clustered on the CUSIP and Trading Day level. No CMBS were rejected in September 2009. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source. Trepp, authors' calculations, public data disclosures on Federal Reserve website, and internal FRBNY data.

Online Data Appendix

Borrower Type Classification

The TALF agents provided a classification for the type for each borrower. That classification was our starting point. For the TALF 2.0 borrowers, we checked the TALF agent classification against publicly available SEC filings, and followed up with the TALF agent if the classification seemed erroneous. We did not have this option for the TALF 1.0 borrowers because we reviewed the TALF agent classification several years after the program ended. Instead, we checked the classification against publicly available SEC filings, material investors listed in the public data disclosure, proprietary databases, news reports, and private placement memoranda and other "know your customer" materials collected by the New York Fed as part of its due diligence. This review resulted in changes to the classifications of about 20 percent of the borrowers for the TALF 1.0 program.

Five REITs borrowed from TALF using more than one subsidiary. We consolidated these subsidiaries into one record for each parent REIT. Our reasoning for doing so is that outside investors invest in the parent REIT, not these subsidiaries.

In contrast, several asset managers created multiple funds to invest in TALF. These funds often share investment management teams and other characteristics. However, since these funds have different underlying investors, we keep them as separate TALF borrowers.

The specific sources we consulted for different borrower types are:

Fixed-life partnerships: publicly available SEC Form D filings in which the TALF borrower or borrower's parent company self-identifies as "private equity fund" or "other investment fund"; private placement memorandum that indicate that fund had a fixed end date and severely restricted redemption rights; references to the fund in other Know Your Customer materials or news reports that were not consistent with hedge funds.

Hedge funds: publicly available SEC Form D filings in which the TALF borrower or borrower's parent company self-identifies as a hedge fund; fund is listed in the Refinitiv, Lipper TASS or Hedge Fund Research hedge fund databases; private placement memorandum that indicate that the fund is an ongoing entity and generally allows redemptions; references to the fund as a hedge fund in other Know Your Customer materials or news reports; material investors that are hedge funds.

Private individuals: news stories about material investors in the funds, and Know Your Customer materials.

Mutual funds and closed-end funds: publicly available shareholder reports, prospectuses, Morningstar write-ups, or fund family websites. This category also includes one vehicle set up by a fund family as a way for several mutual funds to participate in TALF 1.0.

REITs: publicly available 10Ks (for publicly listed REITs) or private placement memoranda (for private REITs), material investor listing in public data disclosure, news reports, and Nareit website.

Banks, insurance companies, and pension funds: company websites

Data Sets

Administrative data from the Federal Reserve Bank of New York

Data on TALF borrowers and on the characteristics of their loans and the securities that collateralize the loans are available on the Federal Reserve Board website at http://www.federalreserve.gov/newsevents/reform_talf.htm for TALF 1.0 and at Federal Reserve Board - Term Asset-Backed Securities Loan Facility. We use the borrower name; the TALF loan amount; the day that the loan was originated; the day that the loan was repaid; the CUSIP of the ABS collateralizing the loan; and the ABS asset class. The list of CUSIPs that were accepted or rejected at each TALF 1.0 CMBS subscription are available at https://www.newyorkfed.org/markets/talf_cusips.html. No CUSIPs were rejected in TALF 2.0.

For borrowers in the TALF 1.0 program, we augment these data with internal data on the date of loan repayment, if that repayment occurred after September 30, 2010, and data on rejected CMBS loan requests. As described above, we also use internal data to classify the borrower type.

Weighted average life and yield

We obtain the weighted average life and yield from Trepp for CMBS and from Bloomberg for other ABS for the TALF 1.0 program, and from Bloomberg for the TALF 2.0 program. In a couple cases where these data were missing, we imputed them by looking up the securities on Structured Finance Portal, a product offered by Moody's Analytics that has information on individual ABS, or by looking at the values of the variables in the months before and after the month in which they are missing.

Calculation of Key Variables

Number and dollar amount of loans outstanding

Our total number and dollar of loan requests do not match the totals in the public-release data files for several reasons.

1. We include loan requests for CMBS that were rejected by FRBNY. In the TALF 1.0 program, 47 loan requests totaling $940 million were rejected.
2. We combine loans that were refinanced in May 2009 into one record. In May 2009, FRBNY introduced two new interest rates—the one-year and two-year Libor swap rates plus 100 basis points (http://www.federalreserve.gov/newsevents/press/monetary/20090421b.htm)—that were intended to correspond more closely to the appropriate base rates for fixed-rate ABS with one-year and two-year weighted average lives. Sixty-three loans collateralized by short-WAL ABS that were taken out at the March or April subscriptions were refinanced into the lower interest rate at the May subscription. These loans each appear as two records in the publicly available data and one loan in our data.
3. We combine assigned loans into one loan if the loan was transferred within the same parent company. TALF borrowers had the option to sell their ABS and assign the TALF financing to the new owner during the period while TALF was still accepting new loan requests. Of the 159 loans in the TALF 1.0 program that were assigned to a new borrower, 115 appear to have been assigned to another company within the same parent financial institution; the remainder were transferred to outside companies with no affiliation with the borrower. We determine this by

whether the first four letters of the names of the original borrower and the new borrower are the same. Most of these same-organization transfers appear to have happened within the same private-equity firm.

4. In 74 cases in the TALF 1.0 program, borrowers chose to break up their loans into smaller loans to provide more repayment flexibility. These 74 cases correspond to 341 loans. We weighted the data so that these loans sum to 74 loans in the total of loans.
5. In the TALF 2.0 program, some loan requests are split into two or more loans in the public-use database. These are loans collateralized by two or more portions of the same CUSIP; since the pieces of the underlying security were acquired separately, they represent more than one record in the database. We combine these into one record each.

Time TALF loan was held.

We measure from the date that the TALF loan closed to the date at which it was repaid. In the case of loans that were refinanced in May 2009 or transferred within the same organization, we measure from the time that the original loan was taken out (pre-refinancing or pre-transfer) to when the final loan (post-refinancing or post-transfer) was repaid.

Appendix Tables

Table A1. Days Held, By Type of Borrower

	Mean	25th percentile	Median	75th percentile
		TALF 1.0		
Insurance	669	338	707	981
Pension Fund	510	477	477	499
Mutual Fund	341	231	328	375
REIT	492	352	441	642
TALF-only	508	253	440	687
Fixed Life Partnership	434	292	399	603
Hedge Fund	399	136	331	560
Private Individuals	401	101	211	607
All	475	223	415	652
		TALF 2.0		
TALF-only	*	167	229	*
Fixed Life Partnership	*	96	140	258
Hedge Fund	*	203	209	223
All	*	167	225	*

Source. Authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.
Statistics are weighted by loan balance. Banks are not broken out separately because of the small sample size.
* denotes statistics that cannot be computed because of outstanding TALF 2.0 loans.

Table A2. Weighted Average Life of CMBS Collateral by Investor Type

TALF Borrower	N	WAL Mean	WAL Median	Less than 1 year	1-2 years	2-3 years	3-4 years	4-5 years	5-6 years	6 plus years
						TALF 1.0				
Insurance	69	2.78	2.28	-	19.3	59.0	0.9	8.5	9.0	3.2
Mutual Fund	129	3.30	2.46	-	24.9	35.0	5.9	7.5	17.9	8.8
REIT	184	3.17	2.54	4.4	18.8	40.4	4.2	15.5	7.4	9.4
TALF-only Fund	254	4.20	4.48	2.4	6.9	33.5	4.7	10.4	16.1	25.9
Hedge Fund	225	3.15	2.49	13.1	22.3	27.7	6.6	7.3	6.3	16.7
Fixed-Life	39	5.00	6.21	7.8	6.8	19.3	-	2.7	6.8	56.7
All	900	3.54	2.66	5.0	16.5	35.2	4.7	9.7	11.3	17.7
						TALF 2.0				
TALF-only Fund	91	5.10	5.38	2.3	2.9	8.6	13.3	15.0	23.6	34.2
Hedge Fund	2	7.02	6.79	-	-	-	-	-	-	100
Fixed-Life	19	8.46	8.65	-	-	-	-	-	-	100
All	112	5.23	5.72	2.0	2.5	7.4	11.4	12.8	20.2	43.7

Note. Sample includes loan requests that were rejected by FRBNY because the CMBS collateral did not pass FRBNY's collateral review. Some loan requests are split into multiple observations in the public data disclosures because the borrower acquired the collateral in multiple transactions. As a result, the "N" in the table is larger than the number of loan requests shown in other tables. Statistics are weighted by loan balance.
Source. Trepp (WAL for TALF 1.0), Bloomberg (WAL for TALF 2.0), authors' calculations, public data disclosures on Federal Reserve website, and FRBNY internal data.

Table A3. Loan Rejections

Date	Number of Loans Rejected	Share of Loans Rejected	Number CUSIPs Rejected	Share of CUSIPs Rejected	Number of Borrowers Rejected	Share of Borrowers Rejected	Earlier Accepted CUSIP	Share of Earlier Accepted
Jul 2009	1	2	1	3	1	7	-	-
Aug 2009	3	2	3	4	2	5	11	13
Sep 2009	0	0	0	0	0	0	24	41
Oct 2009	5	5	5	6	4	9	32	38
Nov 2009	4	5	3	5	4	14	40	63
Dec 2009	3	4	3	5	3	14	37	64
Jan 2010	7	10	5	10	5	31	34	67
Feb 2010	5	8	5	9	3	23	39	70
Mar 2010	19	32	19	35	6	38	32	58
Total	47	7	44	8	28	13	249	46

Note. Some rejected CUSIPs collateralized loan applications from more than one borrower.

Source. Authors' calculations, public data disclosures on Federal Reserve website, and internal FRBNY data.