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Abstract. In response to the near collapse of US securitization markets in 2008, the Federal Reserve created the Term Asset-Backed Securities Loan Facility, which offered non-recourse loans to finance investors' purchases of certain highly rated asset-backed securities. We study the effects of this program and find that it lowered interest rate spreads for some categories of asset-backed securities but had little impact on the pricing of individual securities. These findings suggest that the program improved conditions in securitization markets but did not subsidize individual securities. We also find that the risk of loss to the US government was small.

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1. Introduction

Prior to the financial crisis of 2007-2009, investors in highly rated securities backed by business and consumer loans typically relied on short-term funding markets, such as the repurchase and asset-backed commercial paper markets, to finance their investments. However, beginning in the summer of 2007, creditors pulled back from short-term funding markets in what Brunnermeier (2009) and Gorton (2010) characterize as a run on the shadow banking system. With less funding, and amid more general concerns about ratings on structured products and the economic consequences of the financial crisis, secondary markets for asset-backed securities became less liquid and primary markets for such securities nearly shut down. As an illustration, spreads over swap rates on the triple-A rated tranches of securities backed by auto loans reached nearly 600 basis points by late 2008, as compared to only a few basis points prior to the crisis, and issuance of securities backed by auto loans dwindled to near zero (see Figure 1).

The near collapse of securitization markets in late 2008 raised concerns about consumers' access to credit and household consumption, as about half of credit card loans and a third of auto loans had been funded through securitization in the years leading up to the crisis.[2] Indeed, the average interest rate on auto loans extended by finance companies—which are heavily dependent on securitization—rose from 3.25 percent in July 2008 to over 8 percent by December 2008.[3]

The Federal Reserve responded to these events by creating an innovative liquidity program, the Term Asset Backed Securities Loan Facility (TALF). The program was announced in November 2008 and began operations in March 2009, providing loans with maturities ranging

[2] For credit cards, G.19 Consumer Credit Statistical Release, available at http://www.federalreserve.gov/releases/g19/. For autos, staff estimate.
[3] G.19 Consumer Credit Statistical Release.

from 3 to 5 years to investors for the purchase of newly issued triple-A rated asset-backed securities backed by consumer and small business loans. The TALF loans were non-recourse to the investor and collateralized only by the securities being purchased. Accordingly, all loans were extended for an amount less than the value of the security that was being purchased. The difference between the loan amount and the value of the security being purchased (the "haircut") varied by asset class and maturity.[4] In addition, the Treasury Department provided the Federal Reserve with credit protection equal to 10 percent of the authorized size of the program to keep the Federal Reserve in its traditional role as liquidity provider.[5]

The facility was subsequently expanded to include newly issued, highly rated securities backed by business equipment loans, floorplan loans, mortgage servicer advances, vehicle fleet receivables, insurance premium loans, and commercial mortgages (CMBS). The facility also began accepting existing ("legacy") CMBS. The Federal Reserve Board authorized the TALF to make $200 billion in loans, announced that it was prepared to expand the authorization to $1 trillion if necessary, but ultimately extended only about $70 billion of credit under the program. The spreads on TALF loans were set well below those prevailing in late 2008 but well above the spreads on highly rated ABS in more normal financial conditions, providing investors an incentive to repay their loan as financial conditions normalized. All but the new-issue TALF CMBS programs closed in March 2010, and that program closed in June 2010. By the end of 2010, outstanding TALF loans were just under $25 billion.[6]

A fundamental policy question about the TALF is whether it improved the liquidity of asset-backed securities markets. On the one hand, improvements in U.S. ABS markets in 2009

[4] The haircuts that were applied to TALF loans can be found at www.ny.frb.org/markets/talf_faq.html#10.
[5] In Section 4, we describe in greater detail the characteristics of the facility that were designed to limit the risk of loss to the Federal Reserve and the U.S. Treasury.
[6] Data on outstanding TALF loans can be found at http:www.federalreserve.gov/releases/h41.

suggest that TALF had a meaningful effect on the liquidity of those markets. For example, by the third quarter of 2009, auto loan ABS issuance rebounded to about its average pace in the first half of 2008, and spreads on auto loan ABS fell to within 50 basis points of their pre-crisis range (Figure 1). However, broader capital markets also recovered in 2009. For instance, spreads on triple-A rated corporate bonds narrowed by around 250 basis points in that year, and broad stock-price indexes gained about 25 percent. The roughly coincident improvement of pricing in ABS and broader capital markets raises the question of how to identify the effects of TALF.

We address the question of TALF's effectiveness by studying the market- and security-level effects of the program using a standard event-study methodology (Campbell, Lo, and MacKinlay, 1997). Our event studies examine the change in the spreads on various types of asset-backed securities relative to changes in broader market indexes in the few days or one week surrounding a public announcement about the TALF program. The identification assumptions are that the market- and security-level announcements were a surprise to market participants, and that in the absence of any TALF announcements, ABS spreads during each event window would be unchanged relative to broad market indexes.

In the market-level analysis, we estimate the effect of nine major, public announcements about the program on the market-level pricing for highly rated consumer ABS as well as commercial mortgage backed securities (CMBS). As is standard, the analysis controls for broader movements in other asset prices, and is conducted separately for different categories of asset backed securities. We also compare auto ABS spreads in U.S. securitization markets (relative to broader market pricing in the U.S.) to auto ABS spreads in Europe (relative to broader market pricing in Europe). European ABS markets also came under pressure in 2007, but the ECB provided funding for ABS in a manner much different from the TALF.

In the security-level analysis, we estimate the effect of a determination by the Federal Reserve at nine TALF subscriptions that a specific legacy CMBS did or did not qualify for TALF financing. The analysis examines the change in the yield spread of the CMBS, relative to the changes in the spreads on all CMBS broadly eligible for TALF funding, around the announcement about whether the particular security would be accepted or rejected by the program. If TALF subsidized or certified securities, we would expect the spreads on accepted or rejected securities to experience an outsized change, relative to the spreads of other securities, after this announcement.

In terms of results, we find that announcements about the program's development substantially affected the market-level pricing of highly rated auto ABS and CMBS. This result is fairly consistent across the nine major TALF announcement dates, which strengthens the case that we are identifying the effect of the program. However, we find less evidence that the acceptance or rejection of specific securities from TALF had an impact on the pricing of those securities—moreover, the effects, when found, are small. These results suggest that TALF may have calmed investors about ABS markets as a whole, improving market liquidity and market functioning, but may not have provided substantial subsidies or certification benefits to individual securities.[7]

We offer, however, the following caveats to our results. First, many events occurred during our sample period that substantively affected financial markets, such as the bankruptcy filings of General Motors and Chrysler. These events occurred outside our event windows, but evolving investor expectations about the likelihood of such policies or events could confound our results. Second, our results will not capture the full effect of TALF on the ABS markets if we

[7] The possibility that a TALF-like program could have both market- and security-level effects is demonstrated in the theoretical model in Ashcraft, Garleanu, and Pedersen (2010).

have not identified all TALF-related announcements that the market deemed significant. We believe that we have included all salient announcements, but we cannot fully discern what pieces of information are considered important by financial markets. Finally, our security-level results are based solely on secondary market trading of CMBS and thus may not fully apply to the new issue TALF program, in part since the new issue program launched at an earlier date.

In this paper, we also consider the primary potential cost of the program, the risk of loss to the U.S. government. Importantly, the structural features of the program substantially limited this risk. In addition, data on legacy CMBS securities suggest that, among those CMBS that were "TALF-eligible" according to the program's terms and conditions, the program screened out, i.e. rejected, the riskiest securities. However, the program did appear to attract somewhat riskier than average TALF-eligible securities, which is not surprising given the non-recourse nature of the TALF loans. Nevertheless, on balance, the risk controls of the program appear to have worked. To date, a large volume of TALF loans have been fully repaid ahead of schedule, none have defaulted, and all loans outstanding remain well collateralized.

This paper contributes to the recent literature on the effect of Federal Reserve liquidity facilities on financial markets. Ashcraft, Garleanu, and Pedersen (2010) and Ashcraft, Malz, and Pozsar (2011) find some evidence that TALF reduced spreads of legacy CMBS that were accepted as TALF collateral, but only at a one week horizon and only by a small amount.[8] A number of studies have analyzed the Term Auction Facility's (TAF) impact on liquidity in the interbank funding market in 2007. Wu (2009), as well as McAndrews, Sarkar, and Wang (2008) and Christensen, Lopez, and Rudebusch (2009) find evidence of a liquidity effect from TAF, while Taylor and Williams (2009) do not. These studies differ mainly in how they control for

[8] We also find some evidence of a security-level pricing effect for longer event windows, but the average effect is small and marginally significant.

movements in broader market pricing and bank credit risk. In an analysis of the Asset Backed Money Market Liquidity Facility (AMLF), Duygan-Bump, Parkinson, Rosengren, Suarez, and Willen (2010) compare funds with a relatively high share of securities that were eligible for funding in the AMLF to other funds, and they find that the facility significantly stemmed outflows from the funds with a high share of AMLF-eligible securities.

The remainder of our paper proceeds as follows. In Section 2, we discuss the role of securitization in the broader economy. In Section 3, we describe the market- and security-level data used in our empirical analyses. We then present our market-level event studies in Section 4, beginning with a timeline of announcements related to the TALF program. In Section 5, we turn to the security-level analysis of the program's decision to accept individual legacy CMBS securities for funding. We evaluate the costs of the program to the U.S. government in Section 6, followed by a brief conclusion in Section 7.

2. Securitization and the Broader Economy

In the years leading up to the financial crisis, securitization became an important method for funding loans to households and businesses. Securitization involves the pooling of loans or other receivables and then the funding of the pool with debt securities. The securities are typically issued in tranches, with the highly rated (i.e., low risk) tranches having higher priority and accounting for the majority of the claims on a pool. In addition, the issuer of a securitization usually retains some risk that the loans in the pool are not all repaid. In 2006—the year of peak issuance—gross issuance of asset-backed and mortgage-backed securities totaled nearly $2.4

trillion.[9] Furthermore, securitization funded an estimated half of credit card loans and a third of auto loans in the years preceding the crisis.

Securitization may have benefits and costs for the broader economy. In terms of benefits, securitization has the potential to lower the cost of credit to businesses and households by reducing financial institutions' funding costs. Securitization might be expected to reduce funding costs because it can produce securities that cater to the risk-return preferences of investors. In addition, by providing access to low-cost long-term funding, securitization may help finance companies compete with banks, and such competition could in turn lower the cost of credit to businesses and households. Johnson, Pence, and Vine (2010) present evidence that interest rates on auto loans soared in late 2008, when the disruption in securitization markets severely constrained loan originations by finance companies; these interest rates subsequently dropped as TALF got underway. In terms of costs, it is possible that securitization contributes to financial instability because it relies on funding markets that proved unstable during the financial crisis.[10] In addition, to the extent that securitization lowers regulatory capital requirements of the issuing financial institution without a proportional reduction in the risk borne by that institution, securitization may constitute regulatory capital arbitrage.

Importantly, TALF was not motivated by an assessment that the benefits of securitization outweighed the costs. Securitization had become an important source of funding for loans to businesses and households, and thus the collapse of securitization markets in 2008 threatened to induce lenders to substantially restrict the supply of credit to businesses and households. Thus,

[9] Source: Asset-Backed Alert and Federal Reserve. The total includes MBS issued by the government sponsored enterprises, but excludes asset-backed commercial paper, and collateralized loan and debt obligations.
[10] See Brunnermeier (2009) for a discussion of securitization and its role in the financial crisis of 2007-2008.

TALF was created to increase the availability of credit to households and businesses by restoring liquidity, at least temporarily, to securitization markets.

3. Data

The data used in our empirical analysis come from a variety of sources. For our market-level analysis of consumer ABS markets, we rely on weekly dealer indicative quotes from the J.P. Morgan trading desk of secondary market yield spreads for triple-A U.S. auto, U.S. credit card, U.S. student loan, and European auto ABS. For our market-level analysis of CMBS markets, we use daily indicative quote data on the spread of the CMBX from Markit. The CMBX is a traded index of credit default swaps written on baskets of triple-A rated CMBS with underlying mortgages originated in a particular time period. We employ five different vintages of the CMBX, denoted CMBX1 to CMBX5, where the underlying mortgages for the indexes are from the respective consecutive six-month periods beginning in the first half of 2006 and ending in the first half of 2008. For robustness, we also examine indicative quotes from the J.P Morgan trading desk of secondary market yield spreads on ten-year, thirty percent subordinated triple-A CMBS originated in 2007. According to the J.P. Morgan trading desk, the closest CMBX analogue to this indicative quote measure is the CMBX4. For our security-level analysis of CMBS securities, we use daily indicative quote data from Trepp, a market pricing service.

We also control for changes in broad financial market spreads with indicative quotes on the CDX index of investment-grade corporate credit default swaps from Markit. By using this measure, we are able to isolate idiosyncratic factors specific to the ABS market. We use the 5-year CDX, which is the most liquid contract (Markit, 2010). To align the broad market control with the start of our sample in September 2007, we use the CDX Series 9, which corresponds to a swap on a portfolio of 125 companies that were investment grade in fall 2007. By using a

particular vintage of the CDX, we avoid the compositional changes in the CDX that occur every six months when a new vintage is launched. In our analysis of the European ABS market, we control for broad movements in the price of European corporate credit risk with the iTRAXX index, which is analogous to the CDX for the European market.

Throughout the paper we use indicative quote data rather than actual quotes from arms-length transactions. We rely on indicative quote data because of the lack of price transparency in ABS markets. Unlike stock markets (TAQ) or even corporate credit markets (TRACE), there is no widely available and centralized repository of transaction-based prices. Although prices backed by actual transactions would be preferable, indicative quotes inform market participants about price levels at which ABS dealers are typically willing to trade. In addition, traders generally have a very specific idea of the security associated with their quote, and that concept remains largely constant over time.

4. Market-Level Event Studies

Market Events

The market-level analysis exploits several major announcements about the existence, details, and operation of the TALF program. The announcements are listed chronologically in Table 1 along with an indication of whether the information in the announcement pertained to the TALF program for consumer ABS or the TALF program for CMBS.[11] We chose the announcements that provided substantial new information about the program and thus had the potential to affect consumer ABS or CMBS markets.

[11] For a complete list of TALF announcements, see www.newyorkfed.org/markets/talf_annoucements.html.

The first two TALF-related announcements had the potential to affect consumer ABS markets, but seemed unlikely to affect CMBS markets given that the possibility of funding CMBS in TALF had not yet been announced. The first such event is the announcement of the TALF program on November 25, 2008. The announcement indicated that a non-recourse lending facility was being established to help fund newly issued consumer ABS and ABS guaranteed by the Small Business Administration. This first announcement also outlined the broad parameters of the program as initially conceived, including a one-year term for loans and an auction process for pricing the loans. The second announcement was on December 19 and indicated that the maximum maturity of the TALF loans would be increased from one to three years and the pricing on the loan would be specified in the program's terms and conditions and not determined in an auction as had been indicated in the first announcement.

The next three announcements had the potential to affect both the consumer ABS and CMBS markets. The first of these was the Federal Reserve's February 10 announcement that it was prepared, if necessary, to increase the size of TALF to as much as $1 trillion and to accept other types of securities, such as CMBS and private-label residential mortgage securities. Another announcement, which took place on March 3, indicated that the first TALF subscription for new-issue ABS backed by consumer and small business loans would take place on March 17. On March 19, the Federal Reserve announced the successful completion of the first TALF subscription. This announcement facilitated new issuance, provided valuable information to the market about where securities would price in the dismal environment at the time, demonstrated the willingness of investors to put capital at risk in the asset class, and may have given market participants confidence that the program was viable. The Federal Reserve also announced on March 19 that four new asset classes—ABS collateralized by equipment loans and leases;

floorplan loans; mortgage servicing advances; and vehicle fleet leases—would be eligible collateral for TALF loans. Although CMBS were not eligible collateral for the first subscription, we treat the announcements related to this subscription as a CMBS and a consumer ABS event because they may have increased market participant confidence that the CMBS TALF program would come to fruition. The possibility that these two events signaled nothing to the market about the CMBS TALF program potentially biases our CMBS event study towards finding no effect.

The remaining four events are used only in the TALF CMBS event studies. On March 23, the Treasury announced the creation of Public-Private Investment Partnerships (PPIPs) and indicated that PPIPs might receive TALF financing for legacy CMBS.[12] Details about the haircuts and terms and conditions for the TALF new-issue CMBS program and premium finance ABS were announced on May 1, and the program details for existing (or "legacy") commercial mortgage backed securities were announced on May 19. Our final TALF event is the May 26 announcement by Standard and Poor's that it was likely to modify its rating methodology for CMBS in a manner that would cut roughly in half the pool of legacy CMBS securities eligible for funding in the TALF program.

Market Analysis of Spreads

We preview the results of our market-level consumer ABS analysis in Figure 2, which plots indicative quotes on spreads to swaps for triple-A two-year auto ABS issued in the U.S. and European markets. As a control for market-wide developments, we plot the 5-year CDX Series 9 described earlier in the paper.

[12] The announcement by the U.S. Department of the Treasury of the Public-Private Investment Partnerships can be found at www.treas.gov/offices/management/budget/budget-documents.

Starting first with the U.S. market, spreads on auto ABS (the solid line) continued to climb even after the announcement of TALF and spiked at over 500 basis points in late December 2008. Spreads were largely in line with the CDX (the dashed line) through September, suggesting that ABS spreads over that period were driven largely by market-wide factors. However, ABS spreads subsequently soared far above the CDX.

Subsequently, however, spreads began to decline sharply, reaching around 300 basis points at the end of the first quarter of 2009. At the same time, the CDX index rose amid worries that the government would not be able to avert the collapse and takeover of several major financial institutions. The fact that ABS spreads fell at a time when the market-wide price of risk and the level of risk appeared to rise provides circumstantial evidence that market participants thought that TALF might be successful in providing liquidity to the market.

To analyze the change in spreads more formally, we conduct a standard event study of the effect on spreads of the five TALF announcements that are relevant for the consumer ABS market. We examine spreads on ABS collateralized by auto loans, credit card loans, government-guaranteed student loans, and private student loans.[13] These types of ABS were the original consumer TALF-eligible asset classes. The estimation period is from September 20, 2007, to September 20, 2010. We have earlier data but its inclusion would likely bias our results in favor of finding an effect, given the lower volatility of spread changes prior to the financial crisis.

Our performance measure for asset class *j* is the change in spread levels, computed as

$$\Delta_t^j = \left(s_t^j - s_{t-1}^j\right) - \left(s_t^M - s_{t-1}^M\right). \qquad (1)$$

[13] Private student loans are extended to students for educational expenses that exceed the limits on government-guaranteed student loans.

As our spread data are weekly, s_{t-1}^{j} is the spread on the first day of the week that spans the announcement, and s_t^j is the spread seven days later. Likewise, s_{t-1}^{M} and s_t^M correspond to the spread on the CDX at the beginning and end of the same one-week period. The timing of the announcements varies, so some announcements are near the beginning of the relevant one-week period whereas others are near the end.

To estimate (1), we regress Δ_t^j on dummy variables for the five announcements with the potential to affect the consumer ABS market, where each dummy is equal to 1 on the week that spans the announcement, and zero on all other weeks. As a result, the coefficient on each dummy can be interpreted as the change in the ABS spread relative to the market-wide spread in week *t*.

The results from the market event studies of consumer ABS, presented in Table 2, parallel the findings from Figure 2. Spreads on consumer ABS continued to widen sharply relative to the CDX during the week in which TALF was first announced; market participants may have been more focused on the widespread dislocations in financial markets at that time. However, in early March, spreads on auto and student loan ABS fell by more than the equivalent changes in the CDX. In particular, the point estimate for the March 3 announcement that the first TALF subscription would occur is about -63 basis points for auto loans and -38 basis points for government-guaranteed student loans, and both estimates are statistically significant. Similarly, the March 19 announcement of the successful completion of the first subscription is associated with a 40 basis point decrease in spreads on auto ABS, and is just shy of statistical significance at the 10 percent level. Changes in spreads on credit card or private student loan ABS, however, are not significant for any announcement.

The fact that our results are strongest for auto ABS may stem in part from the fact that TALF targeted the new issue market and our data are from the secondary market. For autos, the legacy ABS trading on the secondary market were fairly similar to the new issue ABS eligible for TALF. Although auto loan delinquencies rose during the financial crisis, the credit performance of auto ABS pools was largely in line with analyst expectations, and the newly issued TALF-eligible ABS were reasonably comparable in credit quality and structure to the securities traded on the secondary market. In contrast, for the other three consumer ABS asset classes, either the underlying loans or the ABS structure performed more poorly than expected during the financial crisis.[14] Secondary market spreads may reflect these asset-specific factors as well as any overall improvement in liquidity.

Another piece of evidence that suggests that TALF had an effect on securitization markets comes from comparing securitization markets in the U.S. to those in Europe. Returning to Figure 2, spreads on auto ABS were at very low levels before the crisis in both the U.S. and Europe, and subsequently climbed sharply through the end of 2008. After the announcement of TALF, spreads diverged, with spreads on European auto ABS (the dotted line) cresting at over 500 basis points in late April 2009, four months after the peak in U.S. auto ABS spreads. As of the third quarter of 2010, European spreads remained around 100 basis points above U.S. spreads. The different trajectories in U.S. and European markets do not appear to result from differences in market-wide factors, as credit default swap spreads on investment-grade corporate bonds followed the same path in both markets (iTRAXX not shown).

Instead, the policy infrastructures in the United States and Europe may account for the difference. ABS are accepted as collateral for both Eurosystem refinancing operations and

[14] See Board of Governors of the Federal Reserve System (2010) for more information on the performance of different types of ABS during the financial crisis.

Federal Reserve discount window loans. However, the Eurosystem accepts ABS issued by pledging institutions as long as the ABS meets a "true sale" criteria. The Federal Reserve does not accept ABS issued by the pledging institution.

As the financial crisis intensified, ABS issuance remained robust, and even increased, in Europe. However, originators switched to a "structure to repo" model in which they used the ABS as repo collateral with the Eurosystem immediately after issuance. In 2008, ABS represented 28 percent of all collateral posted at the Eurosystem, up from 6 percent in 2004, and almost all the ABS were pledged by the originating institution. Although the Eurosystem framework preserved ABS issuance, it came at the cost of a lack of private investor involvement in the market. This lack of investor involvement—in contrast to the TALF program—hindered the price discovery process and likely contributed to the divergence in spreads in the U.S. and Europe.

To formally compare U.S. and European ABS markets, a second layer of differencing is added to the performance measure. The resulting measure is

$$\Delta_t^j = \left[\left(s_t^j - s_{t-1}^j\right) - \left(s_t^M - s_{t-1}^M\right)\right] - \left[\left(s_t^{j,Euro} - s_{t-1}^{j,Euro}\right) - \left(s_t^{M,Euro} - s_{t-1}^{M,Euro}\right)\right] \qquad (2)$$

where *j* in this case is only for the auto segment of the ABS market, as we were unable to obtain yield spread data for European credit card ABS and student loans are an unknown asset class in Europe. Just as the CDX is used to control for broad market movements in credit spreads in the U.S., we use the spread on the iTRAXX to control for broad movements in European credit spreads.

This event study suggests that spreads on U.S. auto ABS fell by about 50 basis points more than spreads on European auto ABS, controlling for the price of overall credit risk in both markets, in the weeks spanning the March 3 and March 19 announcements. The changes are

statistically significant, and the magnitudes of the coefficients are comparable to the earlier auto ABS event study. In contrast, the earlier announcements about the existence and terms of the program, as in the earlier event study, did not have a significant effect on spreads.

The market-level analysis provides evidence that TALF improved the liquidity of the auto ABS market. However, the results for other segments of the consumer ABS market are not that strong. Beyond the idiosyncratic features mentioned above, the weakness of the results may be partly due to the light secondary market trading activity. Many traditional investors, such as pension funds and insurance companies, tend to buy and hold these securities. As a result, dealer indicative quotes for consumer ABS are only provided on a weekly basis, and even these weekly quotes are often constant for a couple weeks in a row. In addition, our first two announcements span the Thanksgiving and Christmas holidays, respectively—periods when trading is particularly light. In contrast, trading in the CMBS market is considerably more active.

We next explore the effect of TALF announcements on spreads in the CMBS market. As shown in Figure 3, spreads on the CMBX4 (the solid line), similar to those on consumer ABS, soared in late 2008. CMBS spreads, however, stayed elevated for a longer time than consumer ABS in the first half of 2009, and did not begin to decline in earnest until March 2009. From the figure, TALF announcements appear to have precipitated some of this decline. We explore this relationship with more rigor in the event study.

We use the seven announcements listed in Table 1 that relate to the CMBS TALF program. Repeating equation 1, our performance measure is the change in spread levels, computed as

$$\Delta_t^j = \left(s_t^j - s_{t-1}^j\right) - \left(s_t^M - s_{t-1}^M\right),$$

where $\left(s_t^i - s_{t-1}^i\right)$ represents the change in spread level on triple-A rated tranches of CMBS measure j.[15] Since the effect of TALF might vary by the vintage of CMBS, we report results for five different vintages of the CMBX and for indicative dealer quotes on spreads to swaps of 10-year CMBS. Additionally, $(s_t^M - s_{t-1}^M)$ represents the equivalent change in the investment-grade CDX that corresponds most closely to each CMBS measure.[16] We then regress Δ_t^j onto dummy variables for the seven announcements listed in Table 1 as having the potential to affect the CMBS market, where each dummy variable is set equal to 1 for the four-day period beginning the day before an announcement, and equal to zero on all other days. As a result, the coefficient on each dummy can be interpreted as the four-day spread change between *t-2* and *t+2*.

The results, presented in Table 3, provide fairly strong evidence that TALF benefited CMBS markets, though as in the consumer study the announcements closer to the actual first CMBS subscription seemed to have more of an effect. The March 23 and May 19 announcements are associated with 60 to 250 basis points drops in the spreads, depending on the CMBS measure, in all six specifications. The March 19 and May 26 announcements are also associated with large and statistically significant changes in the spreads for the four measures corresponding to the most recent CMBS vintages.[17] [18] The fact that these markets are more liquid than the consumer markets may partly explain why we find a stronger effect in this market.

[15] This measure implicitly assumes a beta of 1 on the market index. A regression of $\left(s_t^i - s_{t-1}^i\right)$ on $(s_t^M - s_{t-1}^M)$ over the pre-crisis period from September 21, 2007 to September 1, 2008 confirms this assumption.

[16] We pair each CMBX with the equivalent CDX vintage. For example, the CMBX3, which corresponds to CMBS originated in the first half of 2007, is paired with the CDX that references bonds that were investment grade in the first half of 2007. We pair the 10-year CMBS spreads with its closest analogue, which is the CDX corresponding to the second half of 2007.

[17] As the May 26 S&P announcement halved the share of legacy CMBS that were potentially TALF-eligible, we expect a positive coefficient on this announcement.

[18] As an additional robustness test, we look at changes in indicative quotes on 5-year CMBS around these announcement dates. These data are only available weekly because 5-year CMBS are not traded as actively as 10-year CMBS. These results (not shown in the paper) indicate statistically significant changes in spreads on three announcement dates.

5. Security-Level Event Studies

Our security-level studies are based on the legacy CMBS TALF program, which provides a unique setting to assess the effect of TALF on security performance. Under this program, securities issued before 2009 were eligible collateral for loans, and thus price data are available both before and after the subscription date. (In contrast, securities in the new issue program were generally issued concurrently with the subscription date.)

Legacy CMBS were accepted as collateral for TALF loans in nine subscriptions, one per month, between July 2009 and March 2010. Some broad parameters that established the types of eligible CMBS were made public to investors. For example, all legacy CMBS posted as collateral had to be senior in payment priority to all other interests in the underlying pool of commercial mortgages and had to have at least two triple-A ratings (the top rating for the agency) and no ratings below triple-A. In addition, all securities pledged as collateral for TALF loans were further scrutinized by the Federal Reserve Bank of New York and could be rejected as loan collateral in the event that it was determined that the security posed unacceptable risk. Over the nine subscriptions that accepted legacy CMBS as collateral, 267 distinct securities were accepted as collateral and 44 were rejected. Importantly for our analysis, the acceptance and rejection decisions were announced on the Federal Reserve Bank of New York's website about a week after each subscription; these announcements are the dates used in our security-level event study analysis.

As before, we examine the effect of a legacy CMBS security being accepted or rejected from TALF on security performance using an event-study methodology. We examine the effect of the acceptance and rejection decision on spread levels, controlling for market wide developments with the spread on an index of triple-A rated CMBS. Specifically, we use an

equally-weighted average of spreads on roughly 1,300 CMBS securities that were putatively TALF eligible pending a final credit review.[19] Finally, we only examine the effect of the first instance of acceptance or rejection into or out of the TALF program. A number of securities were accepted or rejected by the program on multiple subscriptions.[20] The information content of a second or third acceptance or rejection after the first is likely small and so we omit these observations from the event study.

Security-level effects from being accepted or rejected by TALF might be expected for several reasons. First, if the haircuts on TALF loans were too small, then TALF acceptance could, in effect, provide a credit subsidy to the security being funded. In addition, to the extent that TALF provides funding and liquidity for certain CMBS securities and not others, acceptance into TALF could signal that a specific security is now "good for TALF." Other investors interested in purchasing CMBS might well focus on those securities for which financing, through future TALF subscriptions, could likely be obtained. Accordingly, liquidity might be expected to improve most for those securities that were accepted for TALF. Also, TALF acceptance could also provide a more general certification effect. Each CMBS security that was accepted as collateral for a TALF loan passed a stringent risk analysis that was designed to exclude securities that were risky relative to others in the senior most triple-A rated set. Acceptance into the TALF may have indicated that a particular CMBS security was a "true" triple-A and may have resulted in increased investor demand.

Security-Level Analysis of Spreads

[19] Results using a proprietary index of AAA CMBS spreads are qualitatively and quantitatively similar to those that employ the equally-weighted average of TALF eligible securities.

[20] A large number of securities were accepted multiple times by the TALF program. Only three securities were rejected at more than one subscription.

Our security-level performance measure is the change in spread levels, computed as a cross-sectional analogue of (1). Specifically,

$$\Delta_k^j = \left(s_{ad+k}^j - s_{ad-k}^j\right) - \left(s_{ad+k}^M - s_{ad-k}^M\right), \quad (3)$$

where $\left(s_{ad+k}^j - s_{ad-k}^j\right)$ represents the change in spread level on security j from k days before the announcement date (*ad*) that the security was accepted or rejected to k days after *ad*. Additionally, $\left(s_{ad+k}^M - s_{ad-k}^M\right)$ represents the corresponding change in the equally-weighted TALF-eligible CMBS index over the same period. We then regress Δ_k^j onto dummy variables for each of the nine separate subscription announcements, July 2009 through March 2010. We also regress Δ_k^j on a constant to test for an average effect across all subscriptions. We estimate the regression on accepted and rejected securities separately. Finally, we examine event windows, $2xk$, ranging between two and ten days.

We look first at securities that were accepted as collateral for TALF loans (table 4). At three of the nine subscriptions, the spreads on the accepted securities fell by a statistically significant 7 to 15 basis points more than the spreads on all putatively eligible CMBS for the two-day event window. Spreads also fell by a statistically significant amount over wider event windows. In particular, in the case of the eight-day event window, spreads fell significantly by between 3 and 19 basis points. However, for some other subscription dates and event windows, the point estimates indicate a statistically significant spread widening.

Averaging across all subscriptions, spreads narrowed on TALF-accepted securities by a statistically insignificant 1 basis point and 0 basis points for the two- and six-day windows, and by a statistically significant 5 basis points for the eight-day window. The remaining point estimates are all positive, implying a relative spread widening over wider event windows, but are

statistically insignificant though the result for the ten-day event window is marginal. Taken together, these results suggest that TALF did not provide much of a certification or subsidization benefit, if any, to accepted securities. Given that investors likely presumed that securities would be accepted, though, this result may not be surprising.

We turn next to the securities that were rejected as TALF collateral (table 5). We begin by noting that the number of rejected securities (44) is much smaller than the number of accepted securities (267). The pooled results in the final row of the table indicate that at all horizons, securities rejected from TALF experienced a spread widening relative to the rest of the CMBS market. The point estimates range from 3 to 7 basis points for event windows between two and six days, and from 17 to 20 basis points for wider event windows. The estimated spread widening is statistically significant for the two-day, eight-day, and ten-day event windows. Across individual subscriptions, the point estimates are generally positive, if often insignificant. In contrast to the results for accepted securities, these findings suggest that TALF had a modest certification or subsidization effect for those securities that were rejected from the program. The stronger results for rejected than aceepted securities may not be surprising inasmuch as investors likely did not anticipate rejection from the program.

6. Risk of Loss to the U.S. Government

The TALF was designed so that risk of loss to the government—the Treasury as well as the Federal Reserve—was extremely low.[21] As mentioned in the introduction, TALF loans were non-recourse, meaning that the borrower could walk away from the loan and surrender the collateral in lieu of repayment. If this were to happen, the borrower would lose its initial investment, which was determined by the "haircut"—the difference between the security's value

[21] Ashcraft, Malz, and Pozsar (2011) provide a comprehensive discussion of the risk controls of the TALF program.

and the loan amount. In other words, the loan included a put option on the ABS security with a strike price equal to the amount of the loan. The most likely situation in which the put would be exercised would be if the TALF loan came due and the value of the collateral had fallen below the amount owed. In most situations, the borrower would not surrender the collateral before the loan came due because the interest and principal payments on the collateral would continue to exceed the interest and principal on the loan even if the collateral were impaired (i.e., the investment would have positive carry).[22] In either case, in the event that collateral was surrendered in lieu of repayment, the residual value of the collateral would offset some of the loss on the loan. The TALF was designed so that even in stressed economic conditions, those net credit costs would, in aggregate, be offset several times over by the accumulated excess interest (roughly the TALF loan rate less the rate charged banks at the Federal Reserve's discount window) earned on the loans.

The Federal Reserve is further insulated from loss by credit protection provided by the Treasury Department under the Troubled Asset Relief Program (TARP). Any losses on TALF loans would first be absorbed by the accumulated excess interest earned on the loans. The Treasury agreed to provide up to $20 billion in funds from the TARP to cover any additional losses, corresponding to 10 percent of the $200 billion authorized size of the program. When the program closed on June 30, 2010, there was only $43 billion in loans outstanding, and the Federal Reserve and Treasury agreed to reduce the credit protection provided under the TARP to $4.3 billion.

Risk Controls

[22] Of course, at some level of impairment the carry on the securities would not cover the interest expense on the loan but the impairment rate required for this to occur would be extraordinarily high for securities accepted by the TALF.

There were several layers of risk control built into the TALF program. First, TALF loans were only extended to finance purchases of securities acquired in arms-length transactions—the investor had to be unaffiliated with the originator or seller and there could be no side-payments between the investor and seller. As a result, since the TALF loans only covered part of the purchase price (as described below), the borrower always had money at risk if the collateral declined in value.

Second, the securities were required to have triple-A ratings from two or more rating agencies and could not have a rating below triple-A from any agency. For CMBS, those ratings had to be from one of five credit rating agencies that had been qualified to provide ratings for the TALF, and the collateral was subject to an additional credit review by the Federal Reserve Bank of New York before being accepted. For ABS, initially credit ratings were accepted based on ratings from the three largest rating agencies and there was no separate credit review. Starting in the third quarter of 2009, however, criteria for credit rating agencies for ABS were established that resulted in an additional agency's ratings being accepted (for a total of four TALF-eligible rating agencies for ABS), and an additional credit review process was established for ABS.

Third, the maximum amount of each TALF loan equaled the market value of the pledged collateral less a haircut that depended on the riskiness of the collateral. The haircuts were calibrated based on the historical price volatility and credit loss experience of the eligible securities. The haircuts varied from 5 percent for securities with short maturities and strong track records such as credit card ABS up to 18 percent for longer-dated securities with higher historical loss experiences and more volatile prices such as CMBS.

And fourth, the TALF loan interest rates were set at spreads chosen to be well above those that prevailed in more normal financial conditions, although below those at the height of

the crisis. TALF loan rates were set as a spread over a variable base rate—usually Libor—for loans secured by variable-rate collateral and over a fixed base rate—the Libor swap spread—for loans backed by fixed-rate collateral. The spreads for TALF loans that were backed by government-guaranteed collateral (SBA ABS and FFELP student loan ABS) were 50 basis points. For other TALF loans, the spreads were 100 basis points. The elevated interest rates helped reduce the risk of the program by serving as a buffer against losses and by providing borrowers an incentive to repay the loans when financial conditions normalized.

CMBS Screening

We use our database of legacy CMBS securities to better understand the TALF screening process along two dimensions. The first is a comparison of the yields on CMBS that were rejected from the program to the yields on CMBS that were accepted. A second perspective is a comparison of the deals that were accepted in the program to the universe of deals that met the broad eligibility requirements for the program (although the deals might not have passed the credit review). Under the terms and conditions of the TALF program, about 1,300 securities (relative to a universe of approximately 11,000 outstanding legacy CMBS) met the broad eligibility requirements for the program. Figure 4 shows both perspectives by plotting from January 2009 to June 2010 the difference in average yield spreads for securities that were accepted and rejected for funding by TALF to the respective average for securities that were putatively TALF eligible.[23]

The plot suggests that high-spread and relatively risky legacy CMBS were screened out of the program, but that accepted securities were somewhat riskier than the pool of CMBS that

[23] In Figure 4, we have normalized the spreads of securities that were accepted and rejected by the TALF relative to an index of triple-A CMBS spreads that met the minimum acceptable criteria of the TALF (two triple-A ratings, etc.) using data from Trepp.

met the broad eligibility requirements.[24] Specifically, yields on legacy CMBS accepted by TALF were consistently about 100 basis points lower than those on legacy CMBS rejected by TALF, an indication of effective screening. The figure also shows that yield spreads on accepted securities, relative to the universe of TALF-eligible CMBS, peaked at about 200 basis points in early 2009, but dropped to about 25 basis points by mid 2009. The modest yield spread (relative to all TALF-eligible CMBS) on accepted securities after mid 2009 suggests that the accepted securities were not substantially riskier than the eligible pool of securities; however, the high level of yield spreads on accepted securities in early 2009 suggests that these securities may have been particularly affected by the illiquidity of the CMBS market prior to the implementation of TALF. Yield spreads on rejected securities followed a similar but more elevated pattern as accepted securities.

While the relative spread levels presented in Figure 4 provide some evidence that those securities brought to the TALF for funding were somewhat riskier, spread levels may not only reflect risk. In particular, during this period many market participants would have argued that spread levels were driven by irrational fears rather than rational assessments of risk. Accordingly, we also examine a standard and more direct measure of risk: the volatility of yield spread changes. Specifically, we compare differences in yield spread volatility between those securities that were and were not brought to the TALF for funding. This comparison complements the spread level analysis in Figure 4 and allows for a more direct assessment of

[24] One possibility for the larger spread on securities brought for TALF funding is that these securities tend to have longer maturities due to the 3 and 5 year tenor of the TALF loans. If credit spreads exhibit an upward sloping term structure then this could account for the difference in spread on securities brought for TALF funding and other securities. In unreported calculations we have performed regressions that control for the maturity (duration) of securities that were and were not brought to the TALF. Even after controlling for duration we still find a significantly higher spread on securities brought to the TALF for funding.

whether higher risk securities, i.e. those with more volatile spreads, were more likely to be brought to the TALF for funding by investors.

A plot of the relative (ratio) volatility of yield spreads (standard deviation of daily spread changes) for securities that were and were not brought to the TALF for funding is presented in Figure 5. Either the standard deviation of spread changes or the standard deviation of proportional spread changes (changes in log spreads) can be used to measure spread volatility, and we show both in the figure. In both cases, we plot the ratio of the equally weighted average of the three-month rolling standard deviation of spread (log spread) changes for those triple-A CMBS securities that were and were not offered as collateral for a TALF loan. A value of this ratio above unity indicates that the representative CMBS security brought to the TALF for funding exhibits higher yield spread volatility than the typical CMBS security that met the minimum TALF eligibility requirements but was never offered as collateral for a TALF loan.

The relative volatilities plotted in Figure 5 suggest that those CMBS securities brought for TALF funding typically exhibited higher spread volatility. In the case of the relative volatility measure based on proportional (log) spread changes, the volatility of those securities brought for TALF funding is actually lower than those securities not offered as TALF collateral from April through June of 2009, but this relationship reverses thereafter for the remainder of the sample period. The measure based on spread changes always indicates that securities brought for TALF funding were riskier than those that were not. Looking at both measures over the entire sample period indicates that securities that were offered as TALF collateral exhibited spread volatility that was typically between 10 and 20 percent higher than those securities not offered as TALF collateral. Accordingly, an analysis of both spread levels and spread volatilities provide some evidence that investors chose to offer somewhat riskier and less liquid CMBS

securities as collateral for TALF loans. Both relative volatility measures also indicate that the differential in risk and liquidity between securities that were and were not brought to the TALF for funding has narrowed significantly.

Loss experience

The improvement in financial markets in 2009 not only makes it difficult to assess the benefits of the TALF, it also makes it difficult to assess the *ex ante* costs. It is not possible to know what the loss experience would have been if financial market conditions had deteriorated sharply further after the program began. Nevertheless, the experience to date suggests that the risks were indeed low. Over two thousand TALF loans were made for about $70 billion in total. As of the beginning of October 2010, although no loans had yet come due, 1200 loans—totaling $40 billion—had been repaid early, including more than half the loans backed by CMBS. All of the remaining TALF loans were current in their payments of interest and principal; no collateral had been surrendered in lieu of repayment. Moreover, all of the collateral backing the outstanding loans retained its triple-A rating. The market value of the collateral backing each of the loans remained well above the loan amount, in all but a few cases by more than the initial haircut. At the end of the third quarter of 2010, the accumulated excess interest (which grows further each month) was just under 2 percent of the total amount of loans outstanding (which decline each month).

The zero loss rate to date on TALF loans raises the question of whether the terms on the program were too tight. While more liberal terms or an expanded list of eligible collateral would likely have increased the amount of loans extended under the program, it would also have increased the financial risk to the Federal Reserve. Moreover, the results from our market and security-level studies suggest that the benefits of increasing the provision of TALF loan might

have been small, as the benefits of the program seemed to occur more at the market level and thus may have been related to the program's ability to provide credit, if necessary, rather than from the actual provision of loans.

7. Conclusion

This paper explored both the benefits and costs of the TALF program, an innovative liquidity program designed to provide liquidity to U.S. ABS markets soon after their collapse in the fall of 2008. In terms of benefits, the results point to substantially stronger effects at the market level than at the security level, which suggests that the impact of TALF may have been to calm investors, broadly speaking, about U.S. ABS markets, rather than to subsidize or certify the particular securities that were funded by the program. In terms of costs to the U.S. government, the program included a number of structural features to keep risks low. In addition, we find that the program screened out the riskiest deals but attracted somewhat riskier than average deals among the pool of potentially eligible securities. Finally, to date none of the loans have defaulted, many have been prepaid early, all collateral remains triple-A, and the market value of the collateral has likely increased substantially with the normalization of financial conditions.

References

Ashcraft, A., Garleanu, N., Pedersen, L.H. 2010. Two monetary tools: interest rates and haircuts. NBER Macroeconomic Annual.

Ashcraft, A., Malz, A., Pozsar, Z. 2011. The Federal Reserve's Term Asset-Backed Securities Loan Facility. Federal Reserve Bank of New York Economic Policy Review, forthcoming.

Board of Governors of the Federal Reserve System. 2010. Report to the Congress on Risk Retention. Available at http://federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf

Brunnermeier, M. 2009. Deciphering the liquidity and credit crunch 2007-08. Journal of Economic Perspectives 23(1), 77-100.

Campbell, J., Lo, A., MacKinlay, A.C. 1997. The econometrics of financial markets. Princeton University Press, Princeton, NJ.

Christensen, J.H.E., Lopez, J.A., Rudebusch, G.D. 2009. Do central bank liquidity facilities affect interbank lending rates? Federal Reserve Bank of San Francisco Working Paper Series, 2009-13.

Duygan-Bump, B., Parkinson, P.M., Rosengren, E.S., Suarez, G.A., Willen, P.S. 2010. How effective were the Federal Reserve emergency liquidity facilities? Evidence from the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility. *QUA Working Paper* QAU10-3, Federal Reserve Bank of Boston.

Gorton, G. 2010. Slapped by the invisible hand: the panic of 2007. Oxford University Press.

Johnson, K., Pence, K., Vine, D. New vehicle sales and credit supply shocks: what happened in 2008? Unpublished manuscript.

Markit (2010). "Markit Credit Indices: A Primer." October. Available at http://www.markit.com/en/products/data/indices/credit-and-loan-indices/index-annexes/primers.page?

McAndrews, J., Sarter, A., Wang, Z. 2008. The effect of the Term Auction Facility on the London Inter-Bank Offered Rate. Federal Reserve Bank of New York Staff Reports, no. 335, July.

Taylor, J., Williams, J.C. 2009. A black swan in the money market. American Economic Journal: Macroeconomics 1(1), 58-83.

Wu, T. Forthcoming. The U.S. money market and the Term Auction Facility in financial crisis of 2007-2009. Review of Economics and Statistics.

Table 1
TALF Timeline of Announcements Used in Market Event Study

Dates	Announcement Description	In Consumer ABS Event Study	In CMBS Event study
11/25/08	TALF announced to the public, only mention consumer and small business asset-backed securities (ABS) as eligible collateral	X	
12/19/08	More details on TALF announced, focus remains on consumer ABS	X	
02/10/09	Possible expansion of TALF to $1 trillion in loans, also first time CMBS mentioned as a possible collateral type	X	X
03/03/09	First consumer TALF subscription announced, suggesting program will actually get off the ground	X	X
03/19/09	First TALF subscription concludes successfully and additional eligible asset classes were announced (equipment loans and leases, floorplan loans, etc.)	X	X
03/23/09	Public-Private Investment partnerships announced along with indication that they might receive TALF financing for legacy CMBS		X
05/01/09	Announcement of TALF new-issue CMBS program		X
05/19/09	Announcement of TALF legacy CMBS program		X
05/26/09	S&P announces change to methodology that would reduce the volume of CMBS eligible for TALF by roughly half		X

Table 2
Changes in triple-A Consumer ABS Spreads in the Week Around TALF Announcements

	Consumer ABS Sector				
Announcement	Auto	Credit Card	Government Student Loan	Private Student Loan	US Auto vs. European Auto
November 25	48 (1.96)	48 (2.11)	48 (2.57)	46 (1.14)	20 (0.92)
December 19	12 (0.47)	12 (0.5)	12 (0.64)	10 (0.25)	-27 (-1.28)
February 10	1 (0.05)	-23 (-1.02)	2 (0.09)	0.11 (0.00)	12 (0.57)
March 3	**-63** (-2.60)	-13 (-0.56)	**-38** (-2.02)	-39 (-0.97)	**-49** (-2.31)
March 19	-40 (-1.63)	11 (0.46)	10 (0.56)	9 (0.22)	**-54** (-2.54)
R^2	.09	.04	.07	.02	.09
#Obs.	150	150	150	150	150

Notes: All results are reported in basis points. In each column we report the results of regressing the difference between triple-A consumer ABS spreads and the spread on the CDX index onto a dummy variable for each announcement date that appears in the table. In the final column we report the results from regressing the difference in spread between US Auto spreads and the CDX index and the difference between European ABS spreads and the spread on the iTRAXX index onto a dummy variable for each announcement. Auto, Credit Card, and Euro Auto ABS Yield Spreads are indicative dealer quotes from the J.P. Morgan trading desk of spreads to swaps for two-year triple-A securities; student loan ABS spreads are for seven-year triple-A securities. The sample is weekly from September 21, 2007 to September 24, 2010. Coefficients that are of the anticipated sign and statistically significant at the 10 percent level are in bold. We report t-statistics in parenthesis below each coefficient estimate.

Table 3
Changes in triple-A CMBX and Cash Spread After TALF Announcements

Announcement	CMBX1	CMBX2	CMBX3	CMBX4	CMBX5	Cash Spread
February 10	-9	-32	-31	-44	-44	**-158**
	(0.26)	(0.95)	(0.83)	(1.17)	(1.07)	(3.22)
March 3	-5	18	20	28	24	38
	(0.14)	(0.54)	(0.52)	(0.73)	(0.58)	(0.77)
March 19	-23	-45	**-75**	**-83**	**-83**	**-101**
	(0.69)	(1.35)	(1.97)	(2.19)	(2.00)	(2.07)
March 23	**-86**	**-143**	**-161**	**-162**	**-162**	**-246**
	(2.59)	(4.23)	(4.24)	(4.27)	(3.91)	(5.01)
May 1	61	55	61	55	50	32
	(1.84)	(1.63)	(1.62)	(1.45)	(1.20)	(0.65)
May 19	**-60**	**-76**	**-110**	**-104**	**-98**	**-150**
	(1.83)	(2.24)	(2.89)	(2.74)	(2.36)	(3.06)
May 26	24	44	**121**	**161**	**157**	**154**
	(0.74)	(1.31)	(3.19)	(4.25)	(3.79)	(3.15)
R^2	.11	.16	.16	.18	.18	.11
#Obs.	746	746	746	723	572	744

Notes: In each column we report the results of regressing the difference in the CMBS spread change and the change in the spread on the CDX index over the two-day window from day t-2 to t+2 onto a set of dummy variables for each announcement date. The CMBX1, CMBX2, …, CMBX5 denote indexes based on credit default swaps (CDS) written on baskets of triple-A-rated commercial mortgage backed securities (CMBS) with underlying mortgages originated in the respective, five consecutive six-month periods from the first half of 2006 to the first half of 2008. Cash spread denotes an indicative dealer quote from the JP Morgan trading desk on the spread to swaps on a ten-year thirty-percent-subordinated triple-A 2007 vintage CMBS bond. The CDX index is an index of investment-grade corporate credit default swaps of the same vintage as the corresponding CMBX index. The sample is daily from September 20, 2007 to September 20, 2010. Coefficients of the anticipated sign that are statistically significant at the 10 percent level are in bold. We report t-statistics in parenthesis underneath the point estimate.

Table 4
Security-Level Acceptance Announcement Effect: Spread Change (basis points)

		Event Window $(ad-k, ad+k)$				
Subscription	# CUSIPS	2 Days	4 Days	6 Days	8 Days	10 Days
7/22/2009	35	17	22	47	**-19**	39
		(5.52)	(5.77)	(1.71)	**(2.12)**	(1.41)
8/26/2009	72	**-7**	**-5**	**-11**	**-12**	**-10**
		(14.80)	**(4.94)**	**(6.08)**	**(1.77)**	**(4.04)**
9/23/2009	34	**-9**	1	-2	17	3
		(3.77)	(0.42)	(0.58)	(4.17)	(0.31)
10/27/2009	49	-1	**-8**	1	-1	15
		(0.25)	**(2.73)**	(0.20)	(0.25)	(1.27)
11/23/2009	21	1	0	**-26**	**-14**	0
		(0.50)	(0.19)	**(9.34)**	**(2.38)**	(0.07)
12/18/2009	18	6	4	2	**-18**	4
		(3.24)	(1.98)	(0.75)	**(6.35)**	(0.78)
1/26/2010	14	3	17	-10	9	17
		(0.31)	(1.48)	(0.88)	(0.76)	(1.45)
2/23/2010	14	**-15**	**-28**	**-16**	**-3**	4
		(12.33)	**(15.52)**	**(7.18)**	**(1.72)**	(1.61)
3/25/2010	10	11	5	4	13	34
		(3.51)	(1.53)	(3.32)	(3.37)	(2.90)
All Subscriptions	267	-1	0	0	**-5**	7
		(0.78)	(0.13)	(0.07)	**(2.65)**	(1.64)

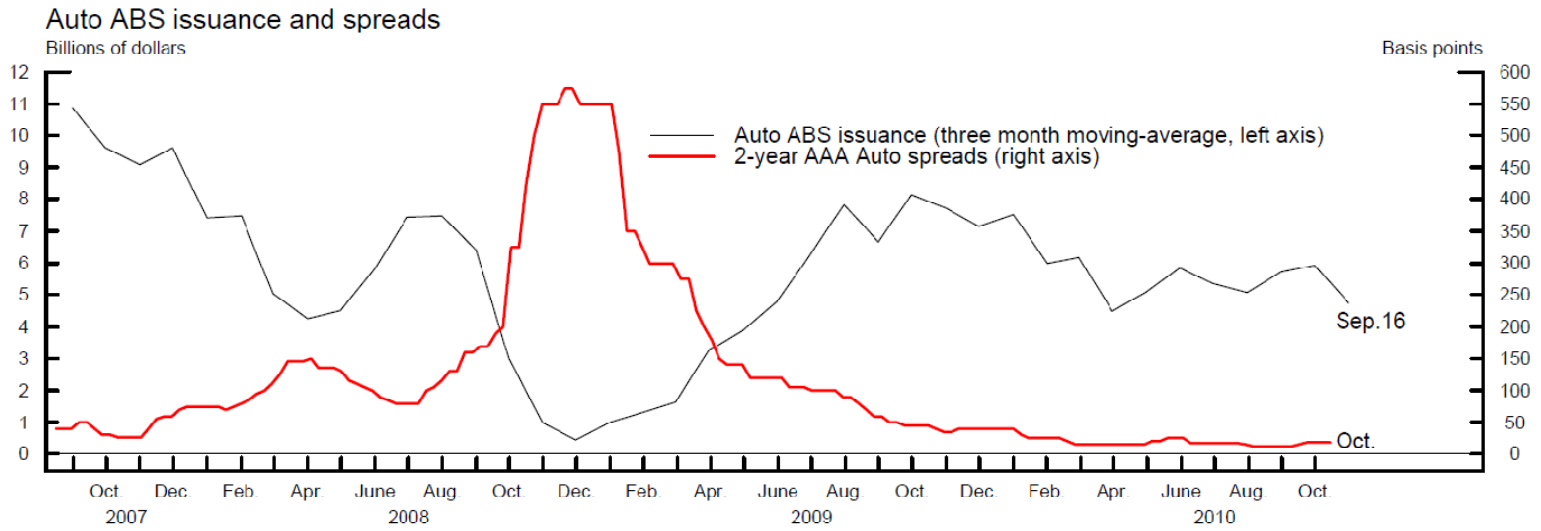
Notes: Above we present the event study results that estimate the average change in security-level spreads before and after each TALF subscription. We present results for symmetric event windows between two and ten days. We report t-statistics in parentheses and results that are significant at the 10% level with the anticipated sign are highlighted in bold.

Table 5
Security-Level Rejection Announcement Effect: Spread Change (basis points)

		Event Window $(ad-k, ad+k)$				
Subscription	# CUSIPS	2 Days	4 Days	6 Days	8 Days	10 Days
7/22/2009	1	**94**	**99**	**81**	**67**	-230
		(5.33)	**(4.12)**	**(3.21)**	**(1.75)**	(3.25)
8/26/2009	3	5	20	223	24	25
		(0.34)	(0.79)	(1.06)	(1.11)	(0.62)
9/23/2009	0	--	--	--	--	--
10/27/2009	5	6	-2	**11**	**38**	36
		(0.99)	(0.63)	**(2.61)**	**(4.39)**	(1.15)
11/23/2009	3	3	19	-4	3	23
		(0.46)	(0.85)	(0.17)	(0.14)	(0.57)
12/18/2009	3	-16	-18	-22	-3	-19
		(0.75)	(0.84)	(0.90)	(0.06)	(0.40)
1/26/2010	5	**25**	**44**	**31**	**31**	33
		(9.95)	**(12.99)**	**(9.03)**	**(8.20)**	(1.07)
2/23/2010	5	-14	-29	-17	-3	6
		(10.44)	(16.42)	(11.13)	(0.96)	(0.20)
3/25/2010	19	**7**	0	-3	15	**35**
		(1.75)	(0.05)	(0.52)	(1.51)	**(2.14)**
All Subscriptions	44	**7**	5	3	**17**	**20**
		(1.85)	(1.08)	(0.69)	**(3.04)**	**(1.76)**

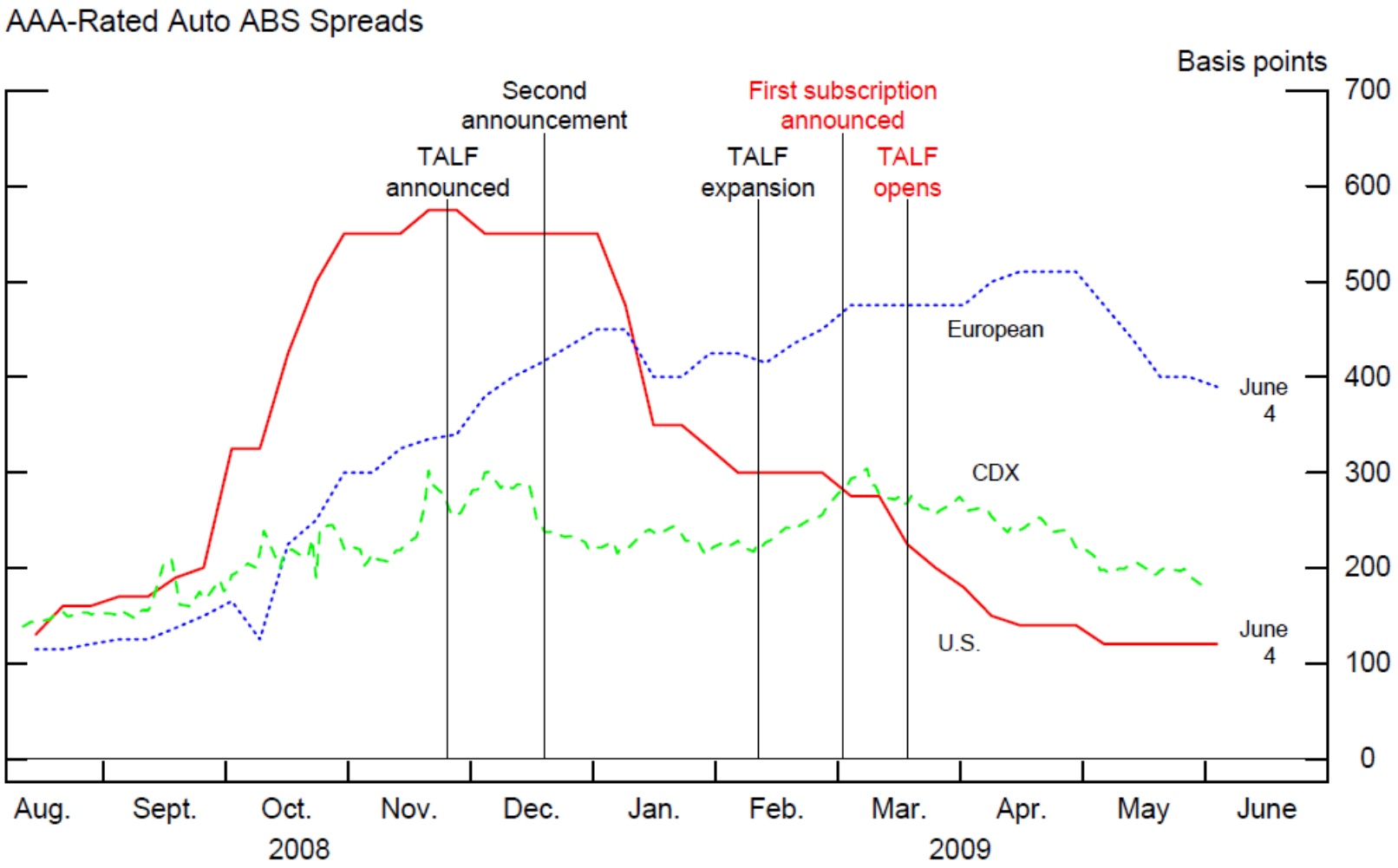
Notes: Above we present the event study results that estimate the average change in security-level spreads before and after each TALF subscription. We present results for symmetric event windows between two and ten days. We report t-statistics in parentheses and results that are significant at the 10% level with the anticipated sign are highlighted in bold.

Figure 1
Auto ABS Spreads and Issuance: 2007-2010



Source. JPMorgan Chase for spreads and Bloomberg for issuance.

Figure 2
Comparison of Spreads on Auto ABS Issued in the U.S. and Europe



Note: Spreads data are for 2-year fixed rate securities.
Source: JPMorgan Chase, Markit.

Figure 3
Event Study: CMBS

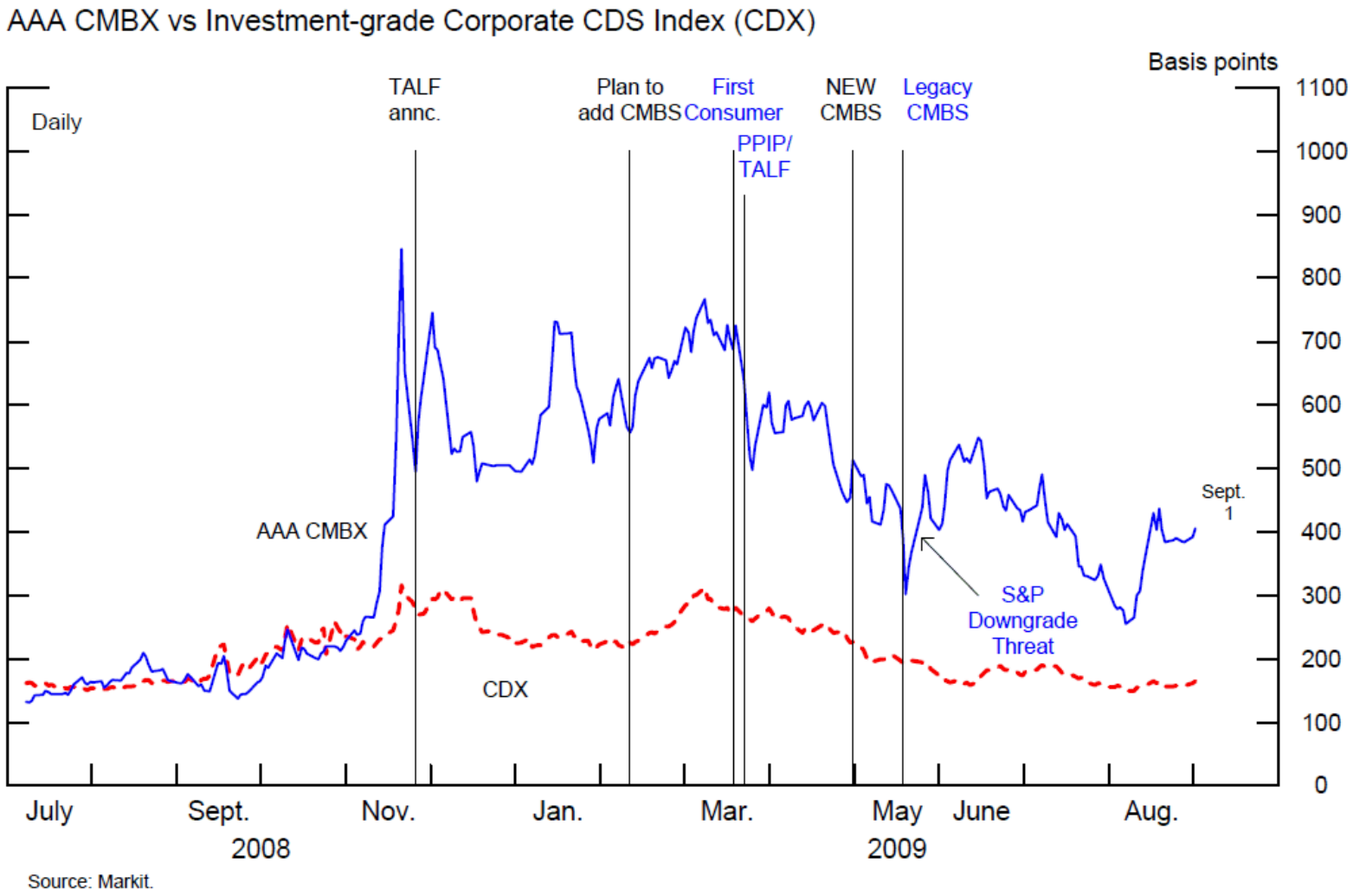
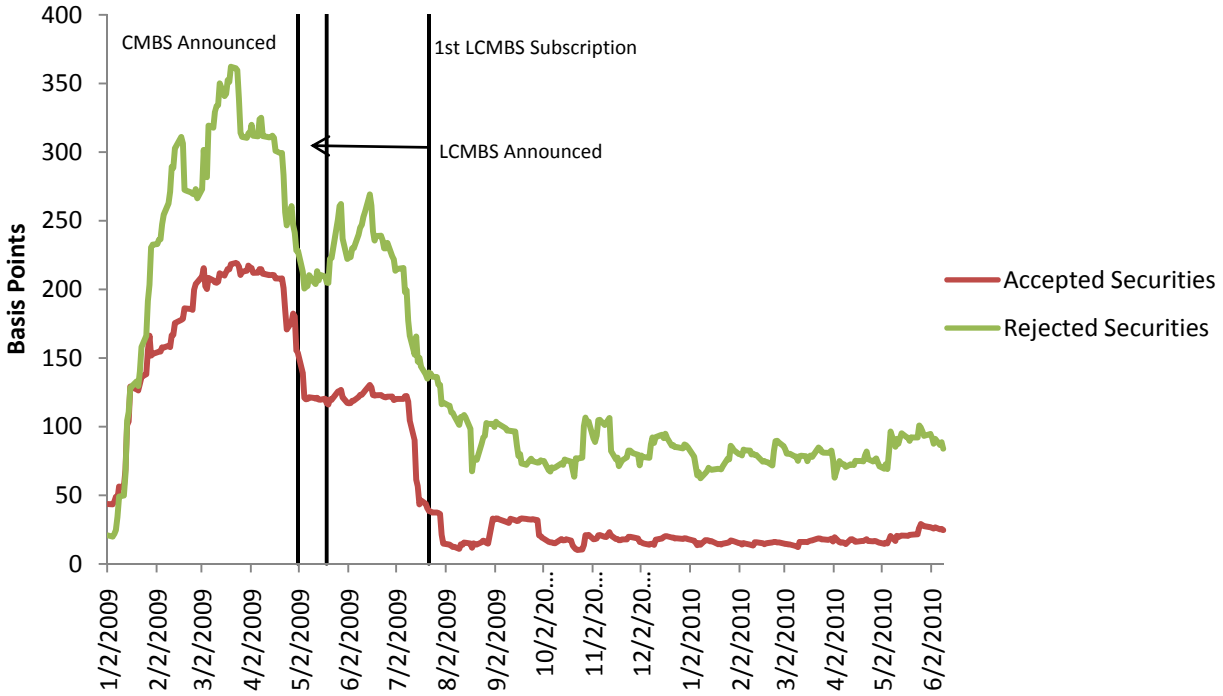
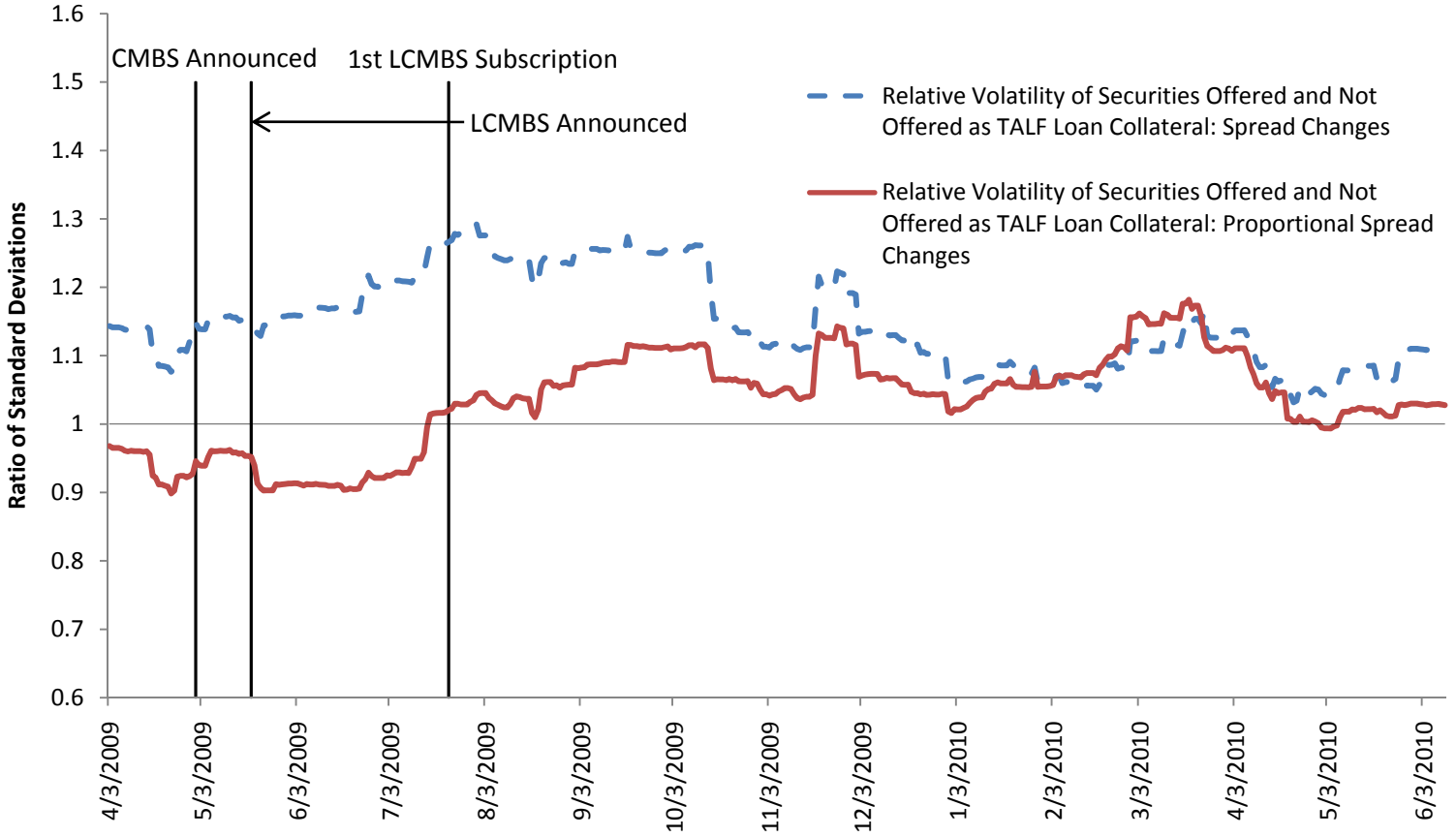


Figure 4
Relative Spread on Accepted and Rejected TALF CMBS Securities



Notes: This figure plots the average difference in yield spread between CMBS securities that were offered as collateral for a TALF loan and the yield spread on a index of triple-A CMBS bonds. In the figure we plot this difference for CMBS securities that were accepted and rejected by the by the program separately. The figure also presents three vertical lines to mark the date at which (1) newly issued CMBS were announced as being added as TALF eligible collateral (5/1/09), (2) legacy CMBS were announced as being added as TALF eligible collateral (5/19/09) and (3) the first legacy CMBS subscription (7/22/09).

Figure 5
Relative Spread Volatility of CMBS Securities Offered and Not Offered as TALF Loan Collateral



Notes: This figure plots the ratio of the equally-weighted average of three-month rolling standard deviations of yield spreads on CMBS securities that were offered as collateral for TALF loans and the equally weighted average of three-month rolling standard deviations of yield spreads on CMBS securities that were not offered as TALF collateral but were putatively eligible for the TALF. The dashed line is calculated using the volatility of spread changes. The solid line is calculated using proportion (log) spread changes. The spread data used for the securities is from Trepp. We also show, using a solid vertical line, three key dates: the date at which the addition of CMBS to the TALF was announced, the date at which the addition of Legacy CMBS to the TALF was announced and the date of the first Legacy CMBS subscription.