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Cliff Notes: The Effects of the 2013 Debt-Ceiling Crisis

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Abstract:

We investigate the effects of the 2013 debt-ceiling crisis on the Treasury bill market and possible spillovers to the commercial paper market and money market funds. We also compare this experience with the prior debt-ceiling crisis in 2011. We find that the 2013 debt-ceiling crisis reduced the demand for Treasury bills that were scheduled to mature right after the debt-ceiling deadline, but not for longer-term Treasury bills. Accordingly, we see that a hump formed at the shorter end of the term structure of Treasury bill yields around the debt-ceiling deadline, with the term structure returning to more normal levels immediately after resolution of the crisis, although with the suggestion of a new yield hump forming around the next perceived debt-ceiling crisis in early 2014. Spillovers from the disruption to the Treasury bill market appeared in the commercial paper market, affecting both commercial paper yields and the maturity composition of issuance. Spillover effects on Treasury and prime money market funds took the form of large, but temporary, outflows by investors, changes in the maturity structure of fund holdings, and changes in the portfolio composition of prime money market fund holdings, which likely were put in place in anticipation of such outflows.

JEL Codes: D31, D63, I32

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1. Introduction

As a result of the continuing debate about the debt ceiling, the U.S. Treasury estimated that, in the absence of an agreement, the borrowing authority of the United States would be exhausted on October 17, 2013, potentially forcing the U.S. government into a technical default. Given the inflamed rhetoric and vows to refuse to compromise emanating from both sides in the budget standoff, it remained uncertain as the deadline approached whether an agreement would be reached in time to prevent the United States government from going over the fiscal cliff into default. The stakes were high, given the roles played in financial markets by U.S. Treasury securities as the "safe" asset that serves as a benchmark for pricing many other securities and as collateral for other financial assets such as repurchase agreements. A default would not only have damaged the credibility of Treasury securities as a safe, stable investment vehicle, but also been extremely disruptive to financial markets, with the potential to cause a financial crisis that would spread far beyond our borders. In the end, an agreement was reached at the deadline, although it delayed rather than solved the debt-ceiling debate.

Although we stopped short of going over the fiscal cliff, at least for the moment, financial markets were not unscathed. In the lead-up to the deadline for resolving the debt-ceiling crisis, short-term Treasury bill rates rose sharply. However, because the issue was not *whether* investors would be paid in full, but *when* they would be paid, the spike in rates centered on instruments that were scheduled to mature during the window when the Treasury might be up against the debt ceiling and thus would face a potential problem making timely payments of principal and interest on its obligations.[1] This crisis window would span the period from October 17, 2013, until the debt-ceiling crisis was resolved through an act of Congress signed by the President.[2] Of course, prior to the resolution of the crisis, the endpoint of the period during which the Treasury bill market would have been disrupted would not have been known.

[1] We focus on Treasury bills, which are short-term instruments that repay principal and all accrued interest at maturity. In a situation of technical default, the timely payment of interest on coupon notes and bonds, as well as the repayment of principal on maturing issues, would be at risk. Because the technical default was expected to be temporary, the cash flow implications, and therefore the pricing impact, on these longer-maturity instruments would have been much less than on short-term Treasury bills.

[2] The first potential missed payments on Treasury bills would not have occurred until the next scheduled maturity date, October 24.

Consequently, the length of time during which financial market yields would have been affected would have been based on the expectations of market participants. In fact, as the crisis deadline approached, the Treasury bill term structure began to exhibit a hump tied to the expected crisis window. Moreover, once the crisis was resolved, the hump in the term structure of short-term Treasury bill rates immediately dissipated.

This policy brief investigates the nature of the disruption to the Treasury bill market in terms of the timing and magnitude of the effect and explores whether the effect was entirely transitory or has had effects that are likely to persist. In addition, we look for indications of a reaction appearing in Treasury bill rates near the next debt-ceiling deadline in early 2014. We then consider the extent to which the disruption was transmitted to other financial instruments and markets, specifically commercial paper and money market funds.

Investors in the Treasury bill market could have reacted in a number of ways to the debt-ceiling crisis and the possibility of a technical default by the U.S. Treasury. First, they could have shifted their demand for Treasury bills to issues with nearby maturity dates outside the crisis window in order to avoid the uncertainty about the ability of the Treasury to make timely principal and interest payments. That is, investors could have decreased their demand for issues maturing during the crisis window, with a compensating increase in demand for issues with maturities either just prior to October 17 or after the expected end of the crisis window, which would have depended on investors' expectations about how quickly the debt-ceiling crisis would be resolved. Of course, as the October 17 deadline approached, there would have been little room to shift into Treasuries that matured before October 17, so the shift would have to have been into issues maturing after the crisis window. Alternatively, investor demand could have shifted, at least partly, to alternative assets, such as commercial paper (CP). In turn, depending on the extent to which the rise in Treasury bill interest rates passed through to CP rates, one might have expected a response by CP issuers, for example shifting their supply of issues to maturity dates before and/or after the crisis window in order to avoid both any hump transmitted to the term structure of CP rates and the possibility of having to roll over their CP at a time when financial markets might be in disarray due to a technical default by the Treasury.

In addition, one might have expected to observe disruptions in other markets tied to Treasury bills, such as money market funds (MMFs). Because MMFs are concerned about liquidity, outflows, and "breaking the buck," they may have been hesitant to hold Treasury bills maturing during the crisis window, both because a delay in principal and interest payments might cause liquidity problems and because they might be concerned that investors, knowing that MMFs hold such Treasury bills, might liquidate their investments in a disorderly manner (a run on MMFs). Again, MMFs could have replaced Treasury bills maturing in the crisis window with Treasury bills of other maturities or, for MMFs not restricted to Treasury securities, such as prime MMFs, with other types of instruments.

2. Treasury Bills

Evidence of a decline in demand for Treasury bills should be apparent in the volume of bids by investors in Treasury bill auctions. A standard indicator of demand in such auctions is the bid-to-cover ratio, which is the ratio of the dollar volume of bids on an issue to the dollar volume of the issue. Figure 1 presents this ratio and its two components transformed to highlight the relative contributions of the bid volume and the issue volume for the weekly one-month (four-week) Treasury bill auctions for the four months preceding the debt-crisis resolution deadline, as well as a few subsequent auctions. The one-month Treasury bill was chosen because its maturity is sufficiently short that securities issued just prior to the debt-ceiling deadline would likely mature during the crisis window. As mentioned above, prior to the actual resolution, the length of this crisis window would have been based on the expectations of market participants.

The three series are presented as normalized log values, using as the benchmark the date when the bid-to-cover ratio was at its local maximum value, just prior to the resolution deadline. Each series is divided by its value on that date, giving it a normalized value of one, and then the logarithm of each series is taken.[3] Because the logarithm of one is equal to zero,

[3] The bid-to-cover ratio is equal to B/I, where B is the bid volume and I is the issue volume. In logarithmic terms, $\log(B/I) = \log(B) - \log(I)$. We normalize the bid-to-cover ratio by dividing B/I by the value on the benchmark date, B_0/I_0. The relationship among the normalized terms is $\log[(B/I)/(B_0/I_0)] = \log(B/B_0) - \log(I/I_0)$.

each series has a zero value on the benchmark date. Therefore, the subsequent movements in the normalized bid volumes and normalized issue volumes indicate their individual contributions to the decline in the bid-to-cover ratio. A black vertical line on the figure indicates the resolution deadline of October 17.

While just prior to the crisis the value of the (untransformed) bid-to-cover ratio had been fluctuating between four and five, the ratio declined sharply to a value of less than three in the auctions in early October that would have matured during the crisis window. Figure 1 shows this decline in the bid-to-cover ratio in its normalized form. Initially, the entire decline in the bid-to-cover ratio is accounted for by the decline in bid volumes, because issue volumes did not change. However, just prior to the resolution deadline, the issue volume declined faster than the bid volume, causing the bid-to-cover ratio to reverse direction. Strikingly, the ratio returned to its pre-crisis range for the October 16 auction, a day when most observers became convinced that Congress would come to an agreement by the end of the day, and it remained in that range subsequently.[4] Moreover, bid volumes recovered slightly in the October 16 auction and then soared in the October 22 auction, the first auction in which bids were due subsequent to resolution of the debt crisis, reaching a volume in line with pre-crisis values. Thus, it appears that the debt-ceiling crisis caused the demand for Treasury bills maturing during the crisis window to decline notably, and then to return to its typical range immediately upon the (temporary) resolution of the crisis.

Additional evidence supporting a conclusion that this pattern for one-month Treasury bills was related to the debt-ceiling crisis is provided in Figure 2. This figure corresponds to Figure 1 except that it is for auctions of the three-month (13-week) Treasury bill. Auctions for the three-month Treasury bill held during the month prior to the deadline likely would not have matured before the debt-ceiling crisis was resolved. While the bid-to-cover ratio did decline during late September and the first half of October, as well as snapping back somewhat at the October 21 auction immediately following the crisis resolution, Figure 2 does not show a notable decline in bid volume, only fluctuations, although the bid series does appear to have

[4] One-month Treasury bills are usually auctioned on Tuesdays. However, the October 16th auction occurred on a Wednesday as a result of the effect of the Columbus Day holiday on the Treasury auction schedule.

been somewhat more volatile than earlier. Rather, it is an increase in issuance volume that is the major contributor to the decline of the bid-to-cover ratio. Thus, the sharp decline in Treasury bill demand appears only for the one-month securities that might have matured during the crisis window.

For comparison purposes, Figures 3 and 4 contain the same information for the bid-to-cover ratio and its two components for the one-month and three-month Treasury bill auctions for the prior debt-ceiling crisis, focusing on August 2, 2011 (indicated by the vertical black line), when the Treasury had estimated that the borrowing authority of the United States would be exhausted. Figure 3 shows evidence of a decline in the bid volume for the one-month Treasury bill leading up to August 2, as well as a strong recovery in bid volume after the debt-ceiling agreement was signed into law on August 2, consistent with the behavior around the 2013 crisis. However, because issue volume also declined, the bid-to-cover ratio does not show a sharp decline prior to the resolution deadline, although it did subsequently decline somewhat with the sharp rebounds in both issuance and bid volume. Figure 4 shows that the three-month Treasury bill issue volume was constant prior to the resolution deadline, causing the bid-to-cover ratio to track fluctuations in bid volume. While bid volume did decline prior to the resolution deadline, the decline was well in advance, and it began to recover well before the crisis was resolved. After the resolution, both issue and bid volumes rose. Thus, consistent with Figure 2 for the 2013 crisis, the timing was not closely tied to the August 2, 2011, resolution deadline, again suggesting that the debt-ceiling crisis effects on Treasury bill demand appear to have been limited to the one-month maturity bills that were likely to mature during the crisis window.

Additional evidence of disruption to the Treasury bill market appears in the changes in the term structure of short-term Treasury yields. The U.S. government went into a partial shutdown on October 1, 2013, with about 800,000 federal employees temporarily furloughed, and with the resolution of the shutdown reached on October 17, 2013. Figure 5 shows how the term structure of Treasury yields evolved as the October 17 resolution deadline approached. Each line in the figure represents the term structure of Treasury yields on a specific date. The lines experience breaks at longer maturity dates because of the less frequent maturity dates of

existing Treasury bills (for example, three- and six-month Treasury bills that would mature that far into the future had not yet been issued). On September 23, a week before the government shutdown, the short-term portion of the term structure remained relatively flat, suggesting no reaction in the term structure at that point to the approaching resolution deadline. However, by October 2, a hump in the term structure had begun to appear around the October 24 maturity date because this was the date the Treasury would potentially miss its first payment on Treasury bills if the government could not reach an agreement by October 17.

However, the patterns of the three remaining term structure dates are the ones that stand out in this figure. First, the term structure around the October 24 maturity date became increasingly hump-shaped. By October 9, a week before the October 17 resolution deadline, the yields on those Treasury bills had spiked. Second, as of October 9 the immediate concerns about the debt ceiling seem to have been limited to approximately a one-month horizon because the term structure flattened for maturities after November 21, suggesting that investors attached a relatively high probability to resolution of the immediate debt-ceiling crisis within a month. However, because the Treasury yield curve remained elevated beyond late November, as of October 9 investors appear to have attributed some (relatively small) remaining probability to persistence of the debt crisis beyond the November 21 maturity date. One week later, on October 16, when the debt-ceiling resolution was beginning to take form, the substantial hump around the October 24 maturity date had become much less pronounced, although yields for subsequent maturities were higher than on October 9. Moreover, another hump seems to have been forming around the maturities of late January through early February of 2014, suggesting that the market had priced in the possibility of another debt ceiling stand-off. In fact, the debt-ceiling resolution (Continuing Appropriations Act, CAA) suspended the debt ceiling only until February 7, 2014. Looking at the aftermath of the CAA on October 17, short-term Treasury bill yields dropped immediately, although the longer-term yields (three to six months) remained at elevated levels, and the small February yield hump persisted.

To take a closer look at the February 2014 yield hump, and the extent to which it has persisted, Figure 6 presents the Treasury term structure for October 16 and some subsequent dates, with the yields measured as yield spreads relative to the baseline/benchmark date of

September 23, which was before the government shutdown and, as shown in Figure 5, before yield humps had begun to form around either the resolution deadline or February 2014. Because the CAA funds the federal government in place of an annual budget through January 15, 2014, and lifts the debt limit through February 7, 2014, one might expect to see a hump in the term structure forming around early February. Instead, it appears that the yield hump began with issues maturing in mid-January for the term structure curves as of dates through early November, although by November 29 the start of that hump had been pushed back to early February. Nevertheless, investors appear to have priced in at most a temporary technical default, given that the yield differential compared to the baseline reverted back to zero for Treasury bills maturing on March 13, 2014. Interestingly, the beginning of another, smaller hump appears to have been forming for maturity dates around early April through May 2014, possibly signifying the period when the "extraordinary measures" that can be taken by the Treasury to delay default will be exhausted, should the government not reach a debt-ceiling resolution in time.

In order to clarify that the appearance of a second hump is distinctive, we compare the 2013 pattern with that for the prior debt-ceiling crisis period in 2011. In 2011, the debt-ceiling standoff needed to be resolved by August 2 to prevent the Treasury from missing payments starting August 4. The resolution, the Budget Control Act (BCA), came on August 2. Figure 7 shows the evolution of the Treasury bill term structure around this resolution deadline, measured analogously to Figure 6 as the deviation from a baseline term structure, in this case using July 20 as the baseline.[5] As in 2013, we see a hump shape at the short end of the term structure on July 29, which disappeared on August 2, although the yields remained elevated on that day compared with their "normal" levels. However, unlike in 2013, the yield differential died off completely by the next day, August 3, and no additional hump appeared at the longer end of this Treasury bill term structure, suggesting that investors understood that the debt-ceiling crisis had been postponed for more than just a few months, in contrast to the 2013 resolution.

[5] We chose July 20, 2011, as the baseline because it is sufficiently after the FOMC meeting of July 18, and before the beginning of the rise in short-term yields due to the debt-ceiling crisis.

3. Commercial Paper

The issue volume and yields of commercial paper (CP) issued by private firms might react to the debt-ceiling crisis in a number of ways. First, because uncertainty concerning fiscal policy in the short term can affect private companies' prospects, they may reduce their shortest-term borrowing in order to limit the effect of uncertainty and potential rollover risk, and they may replace those short-term issues with longer-term borrowing (greater than one month). This substitution effect should dissipate as the maturity becomes longer, to the extent that the substitutability of short-term with longer-term assets is limited. Since such substitution implies an increase in the supply of commercial paper at the longer end of CP maturities, we should expect a steepening of the term structure of commercial paper yields. We call this the *maturity substitution channel*. Second, to the extent that CP, especially high-grade CP, is a reasonably good alternative to Treasury bills for investors, the holders of short-term Treasury bills might switch to CP, which would lead to an increased demand for CP with the shortest maturities just before the resolution deadline, the horizon where we see the hump-shaped reaction of Treasury bill yields. This channel might bring forth an increased volume of CP issuance activity at these shortest maturities. Moreover, because this channel is driven by the demand for CP at the short end, the effect of this channel would also tend to steepen the CP term structure. We call this second channel the *asset substitution channel*.

We analyze these patterns in Figures 8 and 9. Figure 8 shows how the weekly average commercial paper issue volumes across different maturities changed, measured relative to the benchmark week ending September 20, 2013, around and soon after the resolution deadline.[6] Consistent with the maturity substitution channel, we see that the CP issue volume decreased for the shorter maturities of 5–9 days and 10–20 days because these are dates that are close to the resolution deadline of October 17 and the first potentially missed Treasury bill principal and interest payment on October 24. At the same time, through the week ending October 18 the issue volume increased for medium-long maturities (41–80 days), but not as much for the longest CP maturities (>80 days). Consistent with the asset substitution channel, the issue

[6] Hence, the line for September 20 is flat with a value of one.

volumes increased for CP maturing in less than a week.[7] These patterns are the most pronounced for the week ending on October 11, which is the week right before the resolution deadline. Compared with the September 20 benchmark, the issue volumes of CP with maturities of less than one week doubled, and those with maturities of 41–80 days increased six-fold. Moreover, the data for the week ending on October 25 reveal that this pattern disappeared immediately after the government reached an agreement and persisted through the end of November. Finally, the data for October 25 and through November also reveal that the issue volume decreased (relative to "normal") for all maturities, compared with the week ending October 11, potentially suggesting a run on commercial paper issuance by the firms just prior to the resolution deadline. Such behavior would be similar to the run on credit lines by firms observed around the beginning of the recent financial crisis, as firms attempted to build up liquidity on their balance sheets to enable them to weather the (potential) storm.

Figure 9 shows how the weekly issue-volume-weighted commercial paper yields across different maturities changed, measured relative to the benchmark week ending September 20, around and after the resolution deadline.[8] First, unsurprisingly, we see an upward shift of the commercial paper yield curve for the days just prior to the resolution deadline (that is, for the weeks ending October 11 and October 18). Second, the term structure of commercial paper yields steepened in these two weeks, consistent with both the maturity substitution and the asset substitution channels. We also observe a yield hump for the two-month maturity date for the week ending October 11, similar to the hump for 41–80 day issue volumes that same week in Figure 8, consistent with our argument for the maturity substitution channel that the spike in Figure 8 (41–80 day issues) was caused by the commercial paper supply side, driving prices down and yields up. Finally, consistent with the issue volume

[7] We interpret this pattern as evidence of the asset substitution channel because of the additional evidence that the issue volume with maturities less than one week increased only for AA-rated commercial paper, whereas it actually decreased slightly for the issue volume of all commercial paper regardless of grade (the figure is omitted for brevity). This is in line with the argument that investors consider AA-grade commercial paper to be a relatively close substitute for Treasury bills.

[8] Due to data limitations, we do the weighting by matching 1–4 day, 5–9 day, 10–20 day, 21–40 day, 41–80 day, and >80 day issue volumes with commercial paper yields of 1 day, 7 days, 15 days, 1 month, 2 months, and 3 months, respectively. We focus on the AA-rated CP of nonfinancial firms because that of financial firms is thinner and has more missing yields, and even those that exist may be less reliable due to the thinness of the market after September 2008.

behavior shown in Figure 8, the CP term structure shifted downward during the first full week following the debt-ceiling crisis resolution, the week ending October 25, and remained at these lower levels through the end of November.

4. Money Market Funds

Because money market funds hold a substantial volume of Treasury bills, this market ranks high on the list of financial markets that might be affected by spillover effects from the debt-ceiling crisis. First, MMFs are potentially subject to runs. This would be a concern leading up to the crisis resolution deadline date to the extent that investors are concerned about liquidity problems at MMFs that hold Treasury bills that will mature during the crisis window. In fact, to mitigate such potential outflow problems, Fidelity Investments announced that its money market funds had sold all of their Treasuries maturing in late October and early November, while JPMorgan Chase indicated that their money market funds had sold most of their short-term Treasuries. A priori, one would expect outflows to be more severe at MMFs that were more exposed to short-term Treasury bills, such as Treasury MMFs, than at prime MMFs.

In fact, such a pattern is exactly what we observe, as shown in Figures 10 and 11, which show the patterns of assets under management for Treasury and prime MMFs, respectively, around the crisis resolution deadline date. Figure 10 shows a sharp decline in total assets under management at Treasury MMFs beginning about a month before the resolution deadline, falling about 7 percent from September 25 to October 16. However, the outflows were reversed immediately after the debt-ceiling crisis resolution, quickly climbing back to values in the range experienced in August, making it clear that the observed pattern was tied to the debt-ceiling crisis. Figure 11 shows a similar sharp decline leading up to the deadline, although it is on a much smaller scale, accounting for only about a 2 percent decline over the same period. While assets under management at prime MMFs exhibited more volatility than the assets of Treasury MMFs, in both cases we observe a reversal of the decline at the precise time of the

crisis agreement, and assets under management appear to have returned to levels comparable to those prior to the crisis.

For comparison, Figures 12 and 13 show the same information for the 2011 debt-ceiling crisis. Figure 12 shows the same pattern of a sharp decline in assets under management at Treasury MMFs leading up to the debt-ceiling crisis deadline followed by a sharp rebound when an agreement was reached at the deadline, with the decline of over 10 percent exceeding that for Treasury MMFs in the 2013 crisis. Figure 13 shows that prime MMFs exhibited a pattern similar to that in the 2013 crisis, although the decline leading up to the crisis deadline was much larger, at nearly 5 percent, compared with only 2 percent in 2013. In addition, because assets under management at prime MMFs in 2011 exhibited a downward trend, it is more difficult to isolate the effect of the debt-ceiling crisis. Still, the immediate rebound after the crisis resolution before assets resumed their downward trend does strongly suggest a temporary disruption in the pattern of outflows associated with the debt-ceiling crisis.

If MMFs responded to the risk posed by Treasury bills maturing during the crisis window by decreasing their holdings of such securities, they could have replaced those securities either with other Treasury securities not maturing during the crisis window, or, for prime MMFs, with non-Treasury instruments. If prime MMFs chose to take the latter approach, we would have observed a decline in the portfolio share of Treasury securities, although Treasury MMFs would have been quite limited in their ability to adjust. However, if MMFs had merely shifted the maturity distribution of their Treasury securities, the adjustments would not have appeared in their portfolio shares. One way to try to identify such maturity distribution shifts is by looking at the patterns of two maturity measures reported by MMFs: the weighted-average maturity of the portfolio and the share of the portfolio maturing within seven days. Maturity shifting would appear as an increase in the seven-day maturity measure during the period immediately prior to October 17, to the extent that MMFs shifted to shorter maturities, and as an increase in the weighted-average maturity of their portfolios, to the extent that MMFs shifted to longer maturities without offsetting the lengthening of weighted-average maturities with other maturity composition adjustments.

Figure 14 shows the weighted-average maturity of Treasury MMFs around the 2013 debt-ceiling crisis resolution deadline of October 17. The figure shows a clear reduction in the weighted-average maturities of Treasury MMFs, followed by a sharp rebound immediately after the crisis resolution. Figure 15 shows that the seven-day maturity measure of Treasury MMFs declined until just before the crisis resolution date, at which time it spiked upward, although the changes are only in basis points. Interestingly, as in the case of the weighted-average maturity measure, the seven-day maturity measure reversed immediately upon resolution of the crisis.

While it is clear that the behavior of these measures was tied to the debt-ceiling crisis, it is difficult, based on this limited information, to understand exactly how these MMFs were adjusting their portfolios prior to the deadline. Certainly, the rise in the seven-day maturity measure just prior to the deadline is consistent with the steepening of the decline in the weighted-average maturity measure, and the sharp decline in the seven-day measure and sharp increase in the weighted-average maturity measure immediately after the debt-ceiling crisis resolution are also consistent. Still, the simultaneous decline in both the seven-day maturity measure and the weighted-average maturity measure just before the upward spike in the seven-day maturity measure is somewhat puzzling. Such movements could have occurred if the MMFs reduced their holdings of longer-dated issues and concentrated their holdings in shorter-maturity issues that were due to mature just after the expected end of the crisis window.

A possible explanation for this pattern is that MMFs, experiencing outflows, became so concerned about liquidity pressures that they shortened their weighted-average maturities to protect against a surge in outflows. These maturity shifts may then have overwhelmed the effects of movements out of issues maturing within the crisis window, resulting in a net decline in weighted-average maturities prior to the debt-ceiling deadline, a decline that was quickly reversed once a resolution was reached and the threat of significant outflows dissipated. Whatever the explanation, Figures 16 and 17 show strikingly similar patterns for the weighted-average maturity and seven-day maturity measures for prime MMFs. Therefore, we can confidently conclude that the debt-ceiling crisis did disrupt the investment patterns of MMFs, causing them to shift the maturity structure of their holdings.

Prime MMFs, unlike Treasury MMFs, can invest across a range of asset types. Did prime MMFs, in fact, shift out of Treasury issues just prior to the debt-ceiling crisis resolution deadline, and if so, into what types of securities? Figure 18 indicates that prime MMFs did shift out of Treasury securities as the resolution deadline approached. Figure 19 suggests that Treasury securities were replaced by repurchase agreements in the portfolios of prime MMFs. This is particularly interesting insofar as Treasury securities may have been the collateral used for at least some of the repurchase agreements, although the maturities of those Treasury securities may have been limited to issues maturing after the expected date of the debt-ceiling crisis resolution. Another interesting movement in portfolio shares of prime MMFs is evident in Figure 20, which shows a sharp decline in the holdings of commercial paper, a decline that was immediately reversed upon the resolution of the crisis. Given the timing of these adjustments, it is easy to conclude that they were related to the debt-ceiling crisis.

5. Summary and Conclusions

While the last-minute debt-ceiling agreement on October 17 did prevent us from going over the fiscal cliff, the solution was only temporary, with the debt ceiling extended only until February 7, 2014. Although a technical default was avoided, such crises do have costs, including the disruption of financial markets. This policy brief has investigated the effects of the 2013 debt-ceiling crisis on the Treasury bill market and possible spillovers to the commercial paper market and money market funds. We also looked for similarities around the previous debt-ceiling crisis in 2011.

We find that the debt-ceiling crisis did reduce the demand for Treasury bills during the period just before the crisis resolution deadline. Moreover, the effect was found in the one-month auctions for bills that would have matured during the likely crisis window had an agreement not been reached by the deadline. We also find evidence of a hump forming in the Treasury bill term structure of interest rates consistent with a decline in demand for bills maturing during the period when market participants placed an increased probability on the likelihood of the U.S. Treasury going into technical default and being unable to make timely

payments of principal and interest on its obligations. Moreover, once the immediate crisis was resolved, Treasury bill yields returned to a more normal pattern except for a suggestion of another hump in yields coinciding with the next potential debt-ceiling crisis in early 2014.

However, the disruptions were not limited to the Treasury security markets. Other closely related markets also showed effects of the crisis and its resolution. In particular, both interest rates and the pattern of issuance in the commercial paper market were affected. Firms issuing high-grade (AA-rated) commercial paper, a reasonably good substitute for Treasury bills for many investors, shifted their issuance from short-term to longer-term maturities leading up to the crisis deadline, perhaps to limit the uncertainty and potential rollover risk associated with issues that would mature during the expected crisis window when financial markets might be in disarray. Both this maturity substitution channel and the asset substitution channel, whereby investors increased demand for commercial paper to replace their reduced demand for Treasury bills, would tend to steepen the term structure of CP yields, a phenomenon that did, in fact, occur.

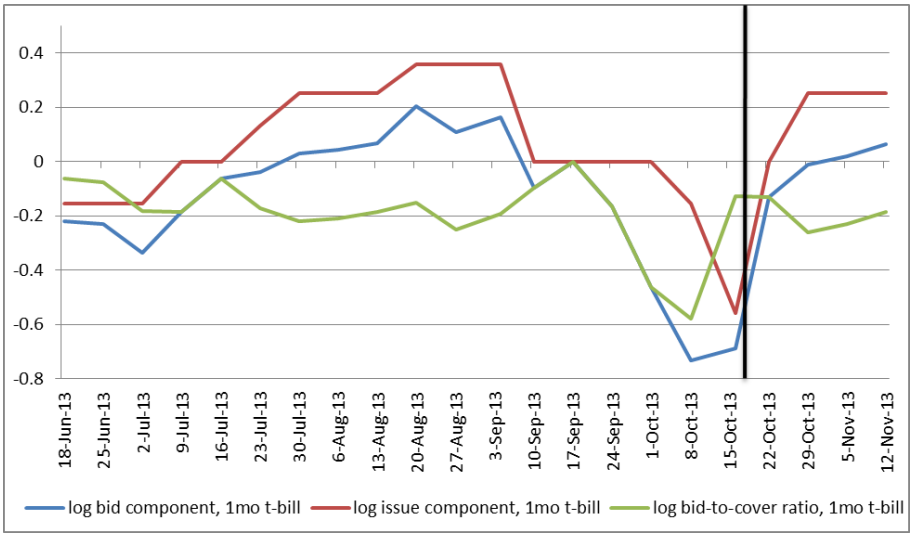
Because money market funds invest in Treasury bills, one would expect the disruptions in the Treasury bill market to spill over there as well. In fact, we find clear evidence that MMF funds did suffer substantial outflows just prior to the resolution deadline, with a sharp reversal occurring immediately upon resolution of the crisis. Because Treasury MMFs' holdings are more concentrated in Treasury securities than prime MMFs' holdings are, the outflows from Treasury MMFs were greater than from prime MMFs, which can invest in a broader array of security types. Moreover, these same patterns obtained during the 2011 debt-ceiling crisis episode. MMFs reacted to the potential threat emanating from the crisis by shortening the weighted-average maturities of their holdings prior to the crisis deadline, with a quick reversal occurring immediately after the crisis agreement. However, prime MMFs also shifted the composition of their portfolios, decreasing their holdings of Treasury securities and increasing their holdings of repurchase agreements.

Consequently, we conclude that the debt-ceiling crisis and its resolution did cause temporary disruptions to the Treasury bill markets and had spillover effects in the commercial paper market that altered yields and issuance patterns. Spillover effects were also evident in the

market for money market funds, as these funds experienced large, temporary outflows by investors and, perhaps in anticipation of such outflows, altered their portfolio holdings.

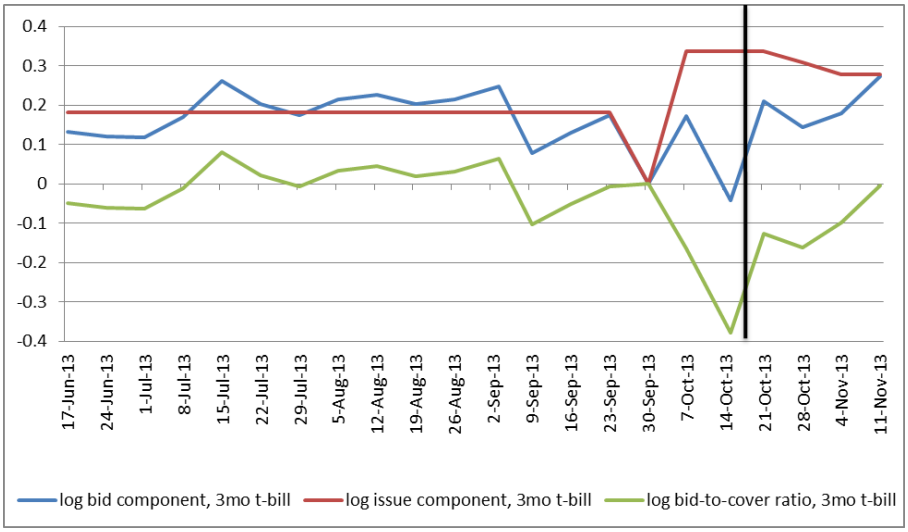
Figures:

Figure 1: One-Month T-bill Normalized Log Bid-to-Cover Ratio and Components during the Period around the 2013 Debt-Ceiling Crisis



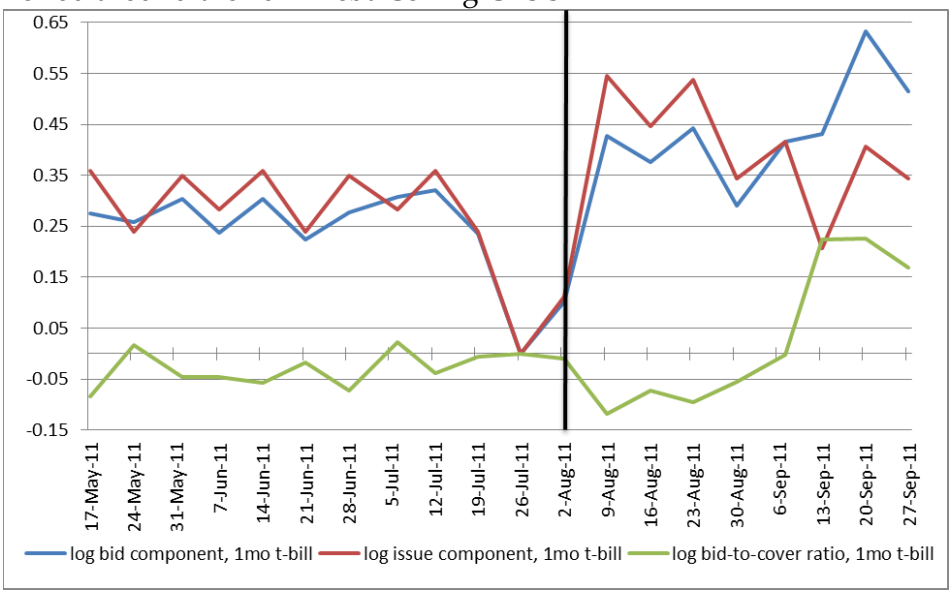
Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was September 17, 2013. The vertical black line indicates the crisis resolution deadline of October 17, 2013.
Source: U.S. Treasury

Figure 2: Three-Month T-bill Normalized Log Bid-to-Cover Ratio and Components during the Period around the 2013 Debt-Ceiling Crisis



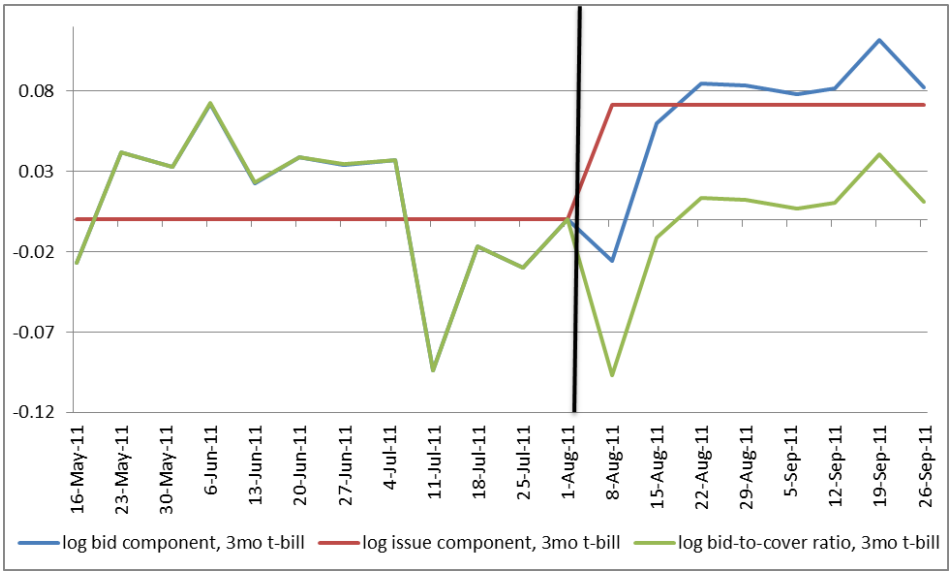
Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was September 30, 2013. The vertical black line indicates the crisis resolution deadline of October 17, 2013.
Source: U.S. Treasury

Figure 3: One-Month T-bill Normalized Log Bid-to-Cover Ratio and Components during the Period around the 2011 Debt-Ceiling Crisis



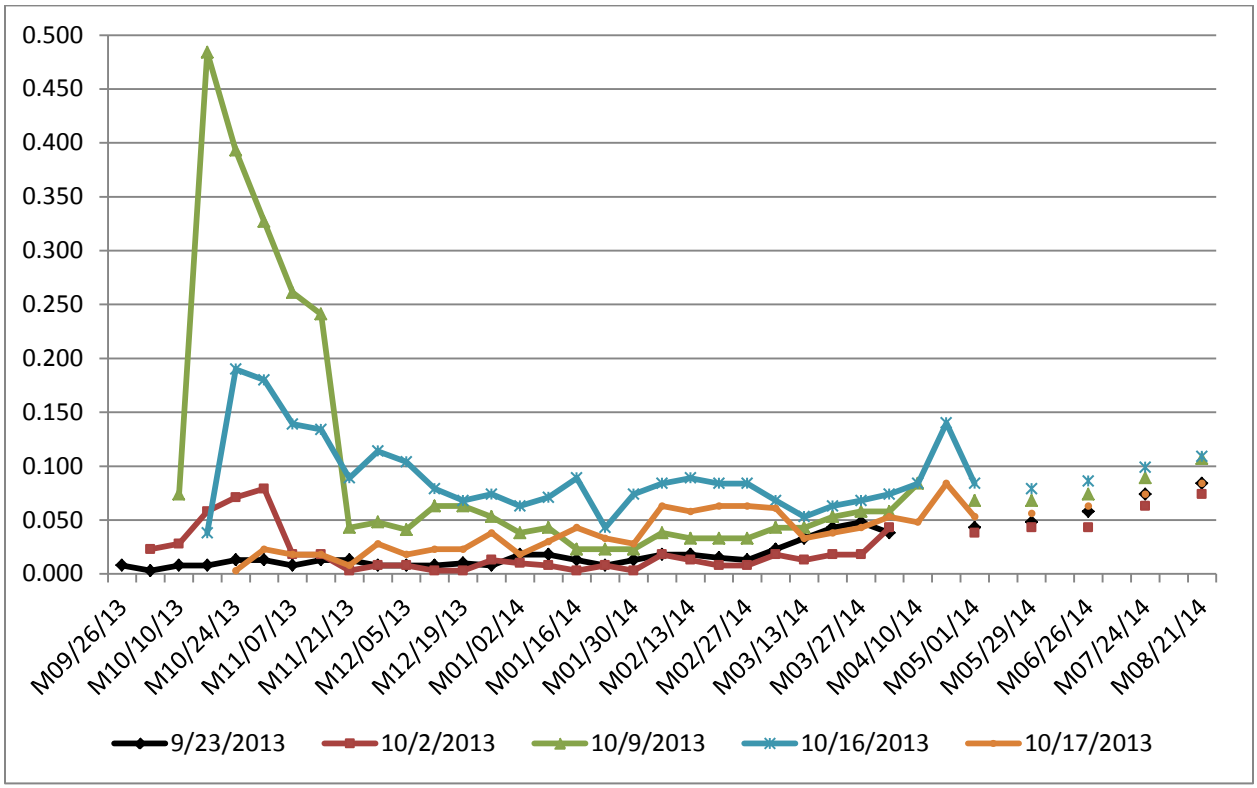
Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was July 26, 2011. The vertical black line indicates the crisis resolution deadline of August 2, 2011.
Source: U.S. Treasury

Figure 4: Three-Month T-bill Normalized Log Bid-to-Cover Ratio and Components during the Period around the 2011 Debt-Ceiling Crisis



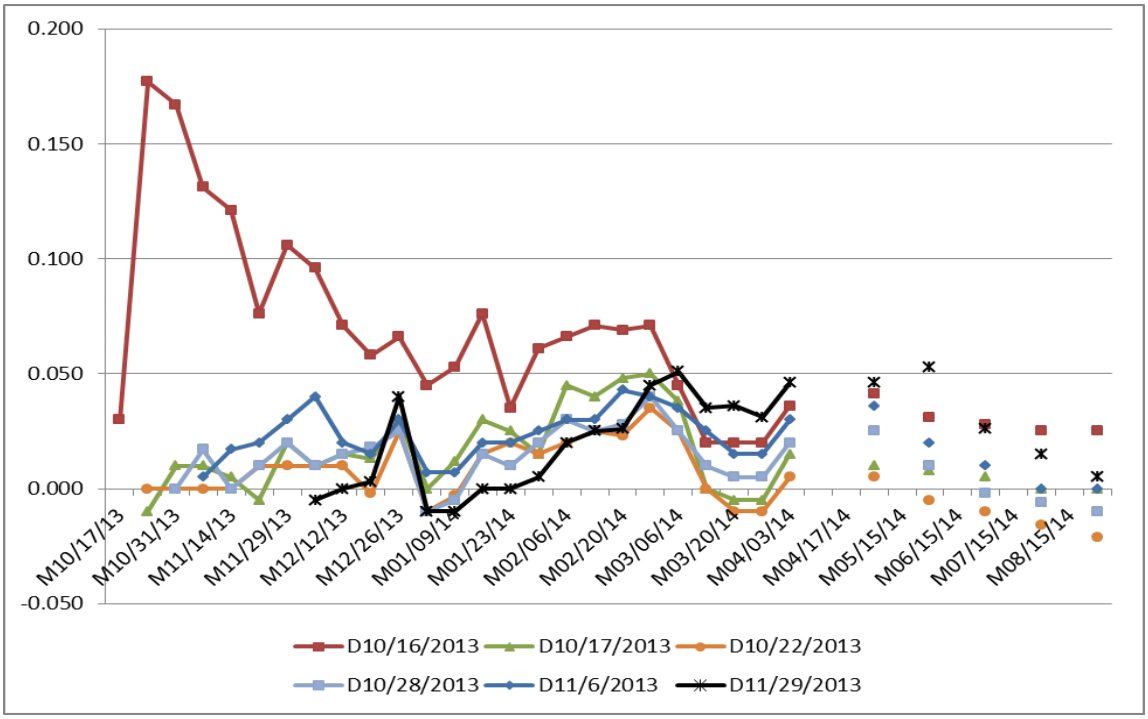
Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was August 1, 2011. The vertical black line indicates the crisis resolution deadline of August 2, 2011.
Source: U.S. Treasury

Figure 5: Yields of Treasuries with Different Maturities on Selected Dates during the 2013 Debt-Ceiling Crisis, Beginning Four Weeks before the Debt-Ceiling Resolution on October 17, 2013.



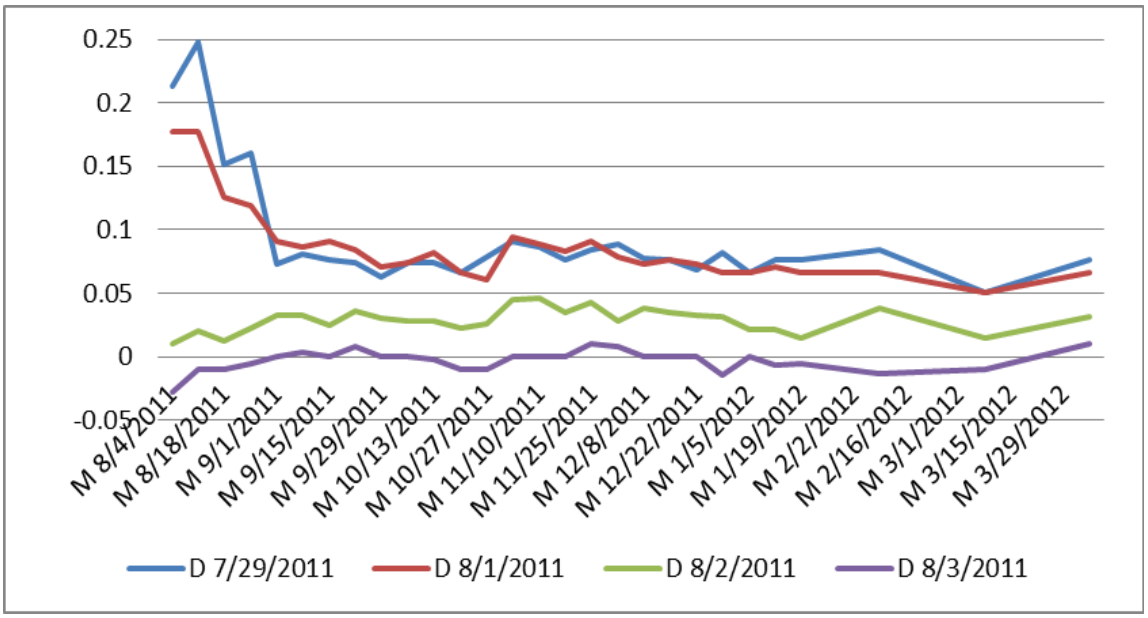
Source: Bloomberg

Figure 6: Yields of Treasuries with Different Maturities, Measured as the Excess of the Yields Relative to Those on 9/23/2013, on Selected Dates near and after the Debt-Ceiling Resolution on October 17, 2013.



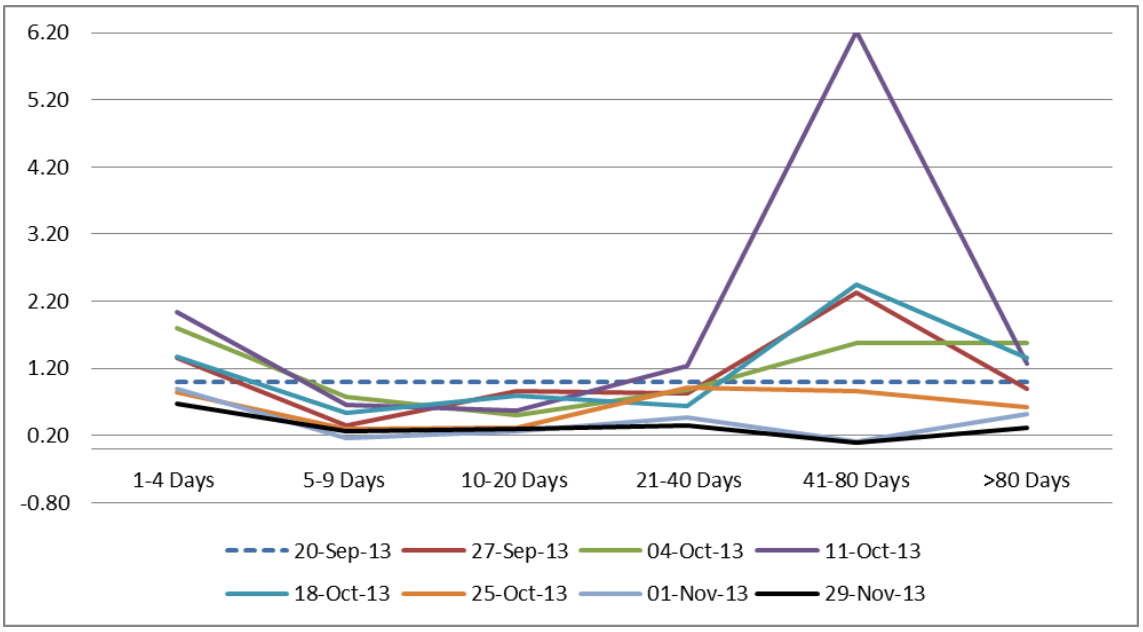
Source: Bloomberg

Figure 7: Yields of Treasuries with Different Maturities, Measured as the Excess of the Yields Relative to those on 7/20/2011, on Selected Dates near and after the Debt-Ceiling Resolution (Budget Control Act) on August 2, 2011.



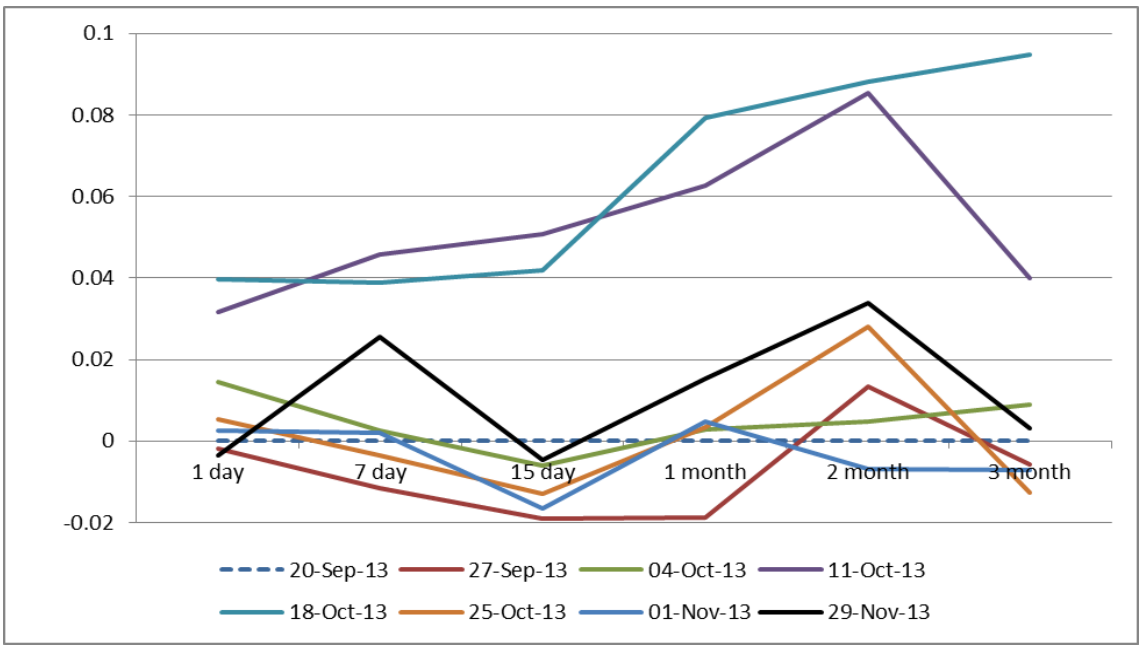
Source: Bloomberg

Figure 8: Weekly Average Issue Volume of High-Grade (AA) Commercial Paper by Maturity, Measured as a Fraction of the Average Issue Volume in the Week Ending 9/20/2013.



Source: Federal Reserve Board, Haver Analytics

Figure 9: Weekly Issue-Volume-Weighted Yields of High-Grade (AA) Commercial Paper of Nonfinancial Firms by Maturity, Measured as the Excess over Those for the 9/20/2013 Baseline Yields

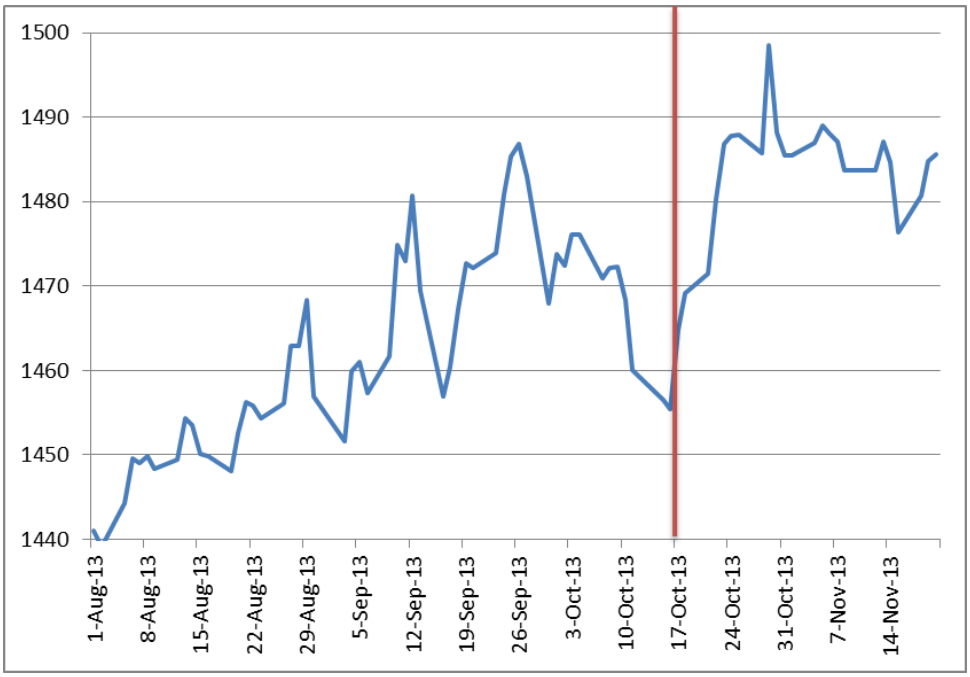


Source: Federal Reserve Board, Haver Analytics

Figure 10: Total Assets under Management for Treasury MMFs ($bil) during the Period around the 2013 Debt-Ceiling Crisis

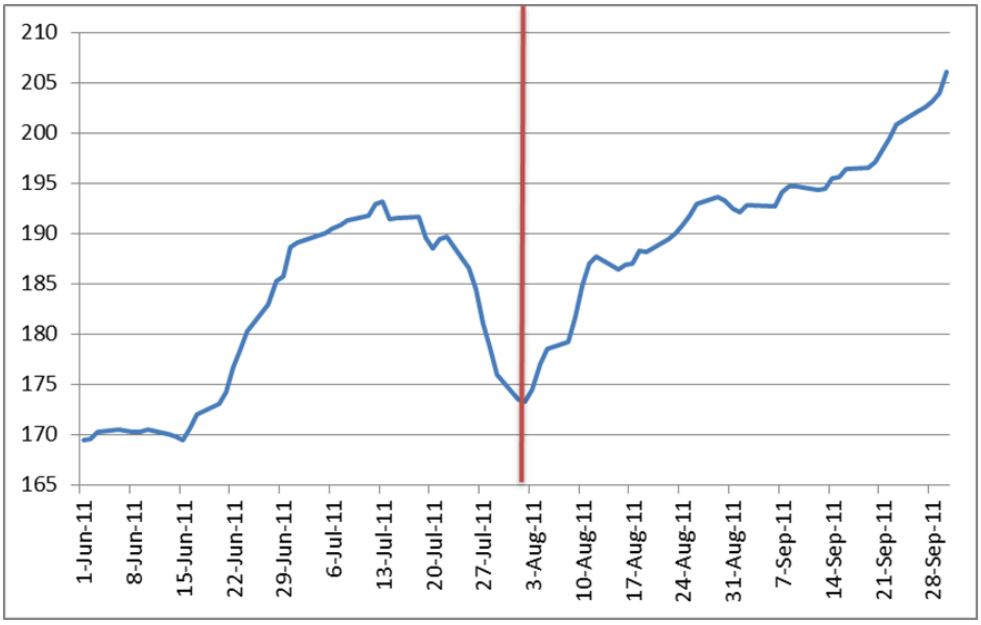
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 11: Total Assets under Management for Prime MMFs ($bil) during the Period around the 2013 Debt-Ceiling Crisis



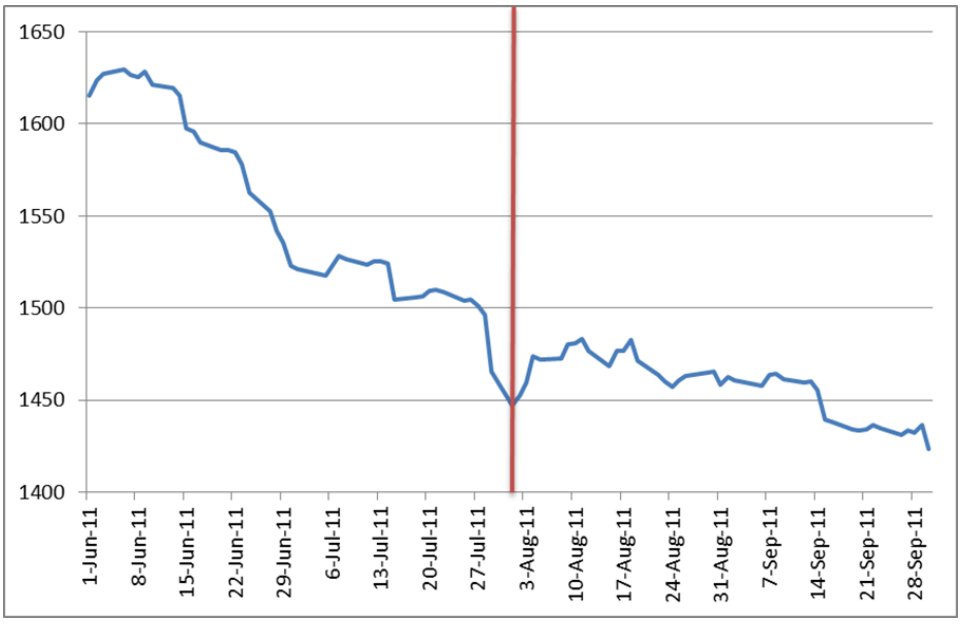
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 12: Total Assets under Management for Treasury MMFs ($bil) during the Period around the 2011 Debt-Ceiling Crisis



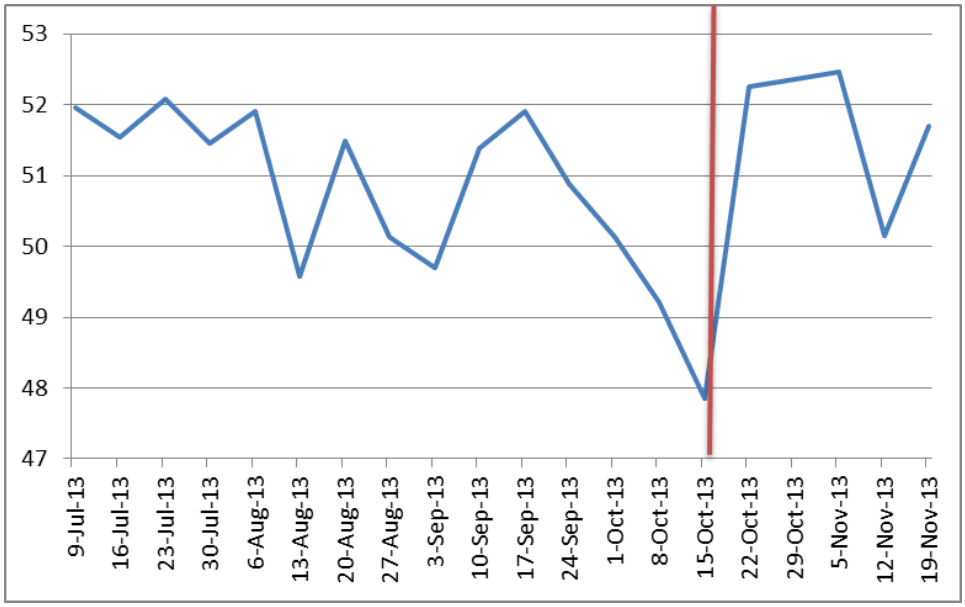
Note: The vertical line indicates the resolution deadline of August 2, 2011.
Source: iMoneyNet

Figure 13: Total Assets under Management for Prime MMFs ($bil) during the Period around the 2011 Debt-Ceiling Crisis



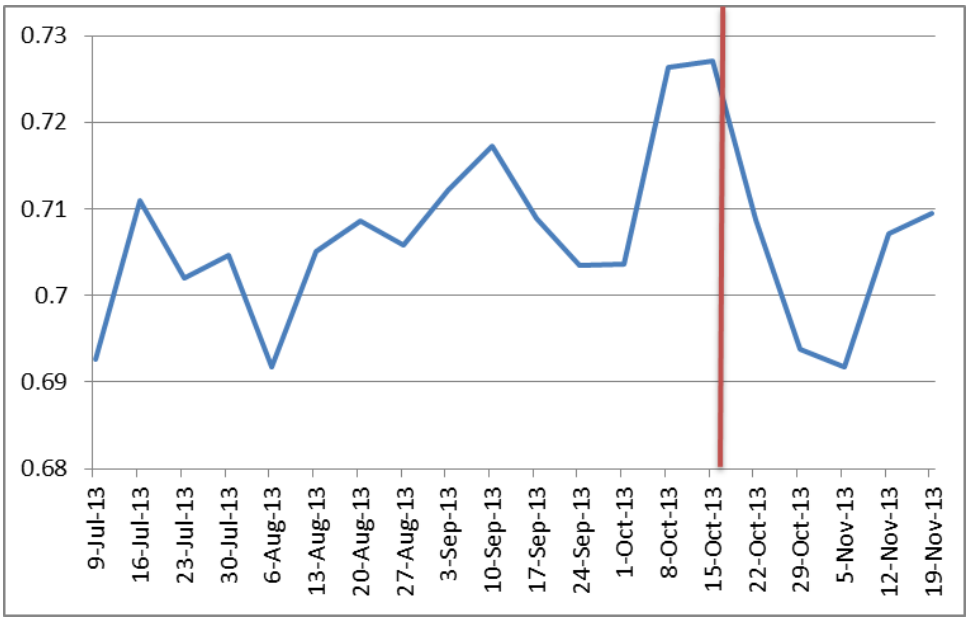
Note: The vertical line indicates the resolution deadline of August 2, 2011.
Source: iMoneyNet

Figure 14: Weighted-Average Maturity (days) of Treasury MMFs during the Period around the 2013 Debt-Ceiling Crisis



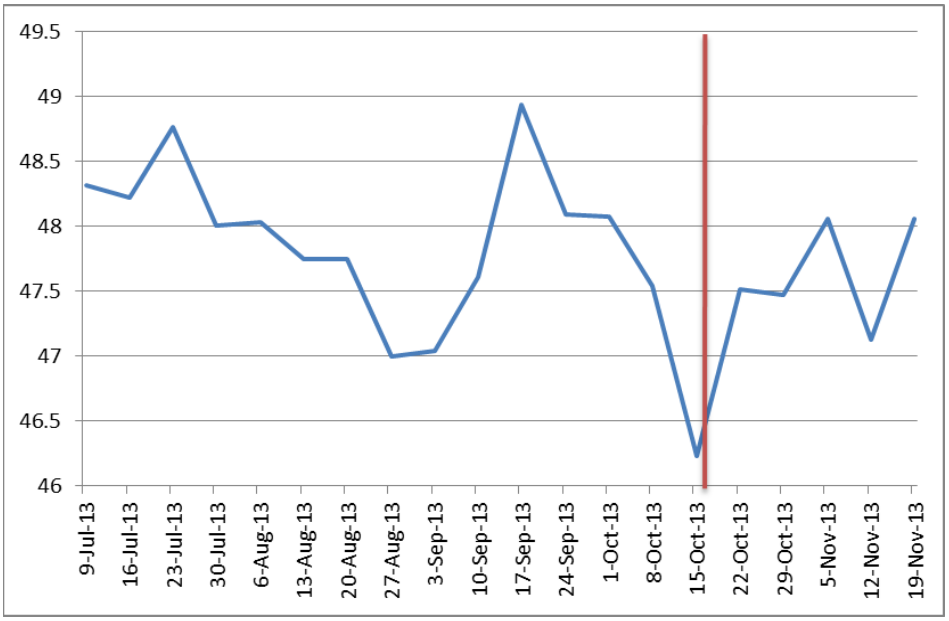
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 15: Percentage of Treasury MMF Holdings Maturing in the Next Seven Days during the Period around the 2013 Debt-Ceiling Crisis



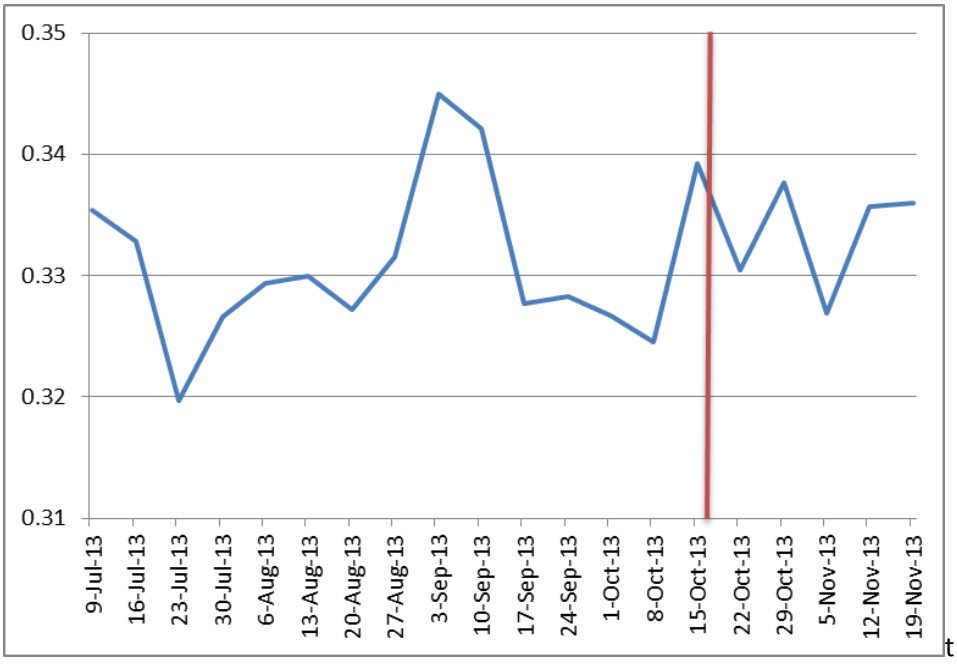
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 16: Weighted Average Maturity (days) of Prime MMFs during the Period around the 2013 Debt-Ceiling Crisis



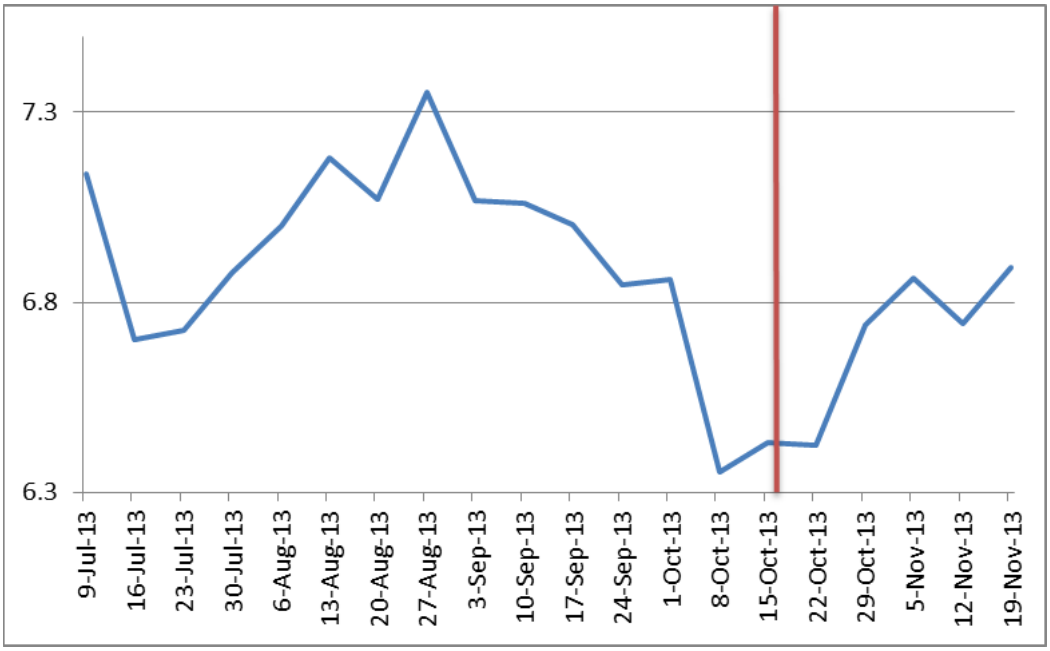
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 17: Percentage of Prime MMF Holdings Maturing in the Next Seven Days during the Period around the 2013 Debt-Ceiling Crisis



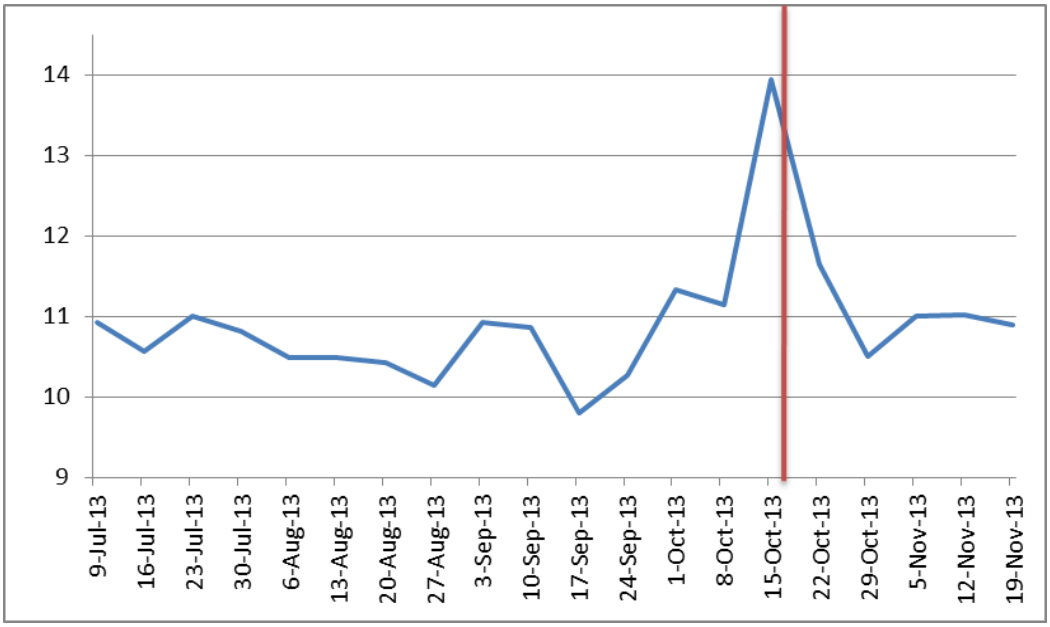
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 18: Percentage of Prime MMF Holdings in Treasury Securities during the Period around the 2013 Debt-Ceiling Crisis



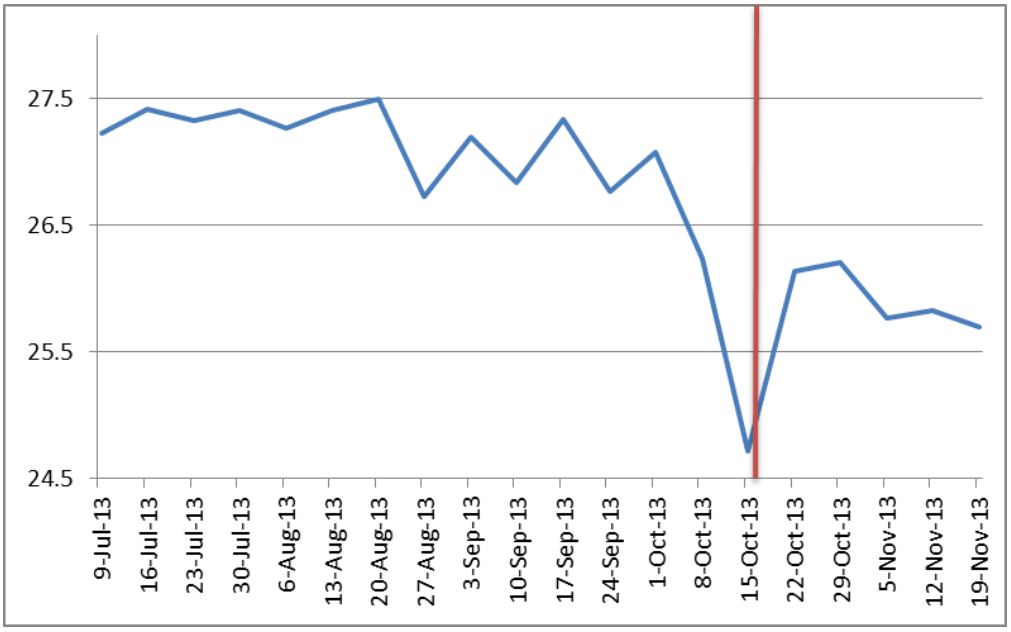
Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 19: Percentage of Prime MMF Holdings in Repurchase Agreements during the Period around the 2013 Debt-Ceiling Crisis



Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet

Figure 20: Percentage of Prime MMF Holdings in Commercial Paper during the Period around the 2013 Debt-Ceiling Crisis



Note: The vertical line indicates the resolution deadline of October 17, 2013.
Source: iMoneyNet