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16. Purchases of Longer-Term Treasury Securities

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Executive Summary

This note examines the use of large-scale purchases of long-term Treasury securities as an alternative monetary policy tool when short-term interest rates are at the zero bound. We assume that the goal of such purchases would be to reduce long-term Treasury yields and thus to push down long-term borrowing costs for the private sector, including mortgage rates and corporate bond yields. Lower long-term Treasury yields would tend to push up the value of government bonds held by the private sector and might also be associated with downward pressure on the foreign exchange value of the dollar.

Overall, the evidence suggests that this policy tool could have the desired effects, but that the scale of the purchases would have to be very large. Estimates from historical data suggest that a purchase of \$50 billion of longer-term Treasury securities (1 percent of all marketable Treasury debt held by the public) would lower the 10-year Treasury yield somewhere between 2 and 10 basis points.² It is possible, however, that were Federal Reserve holdings of long-term Treasury securities as a share of the total to reach very high levels, the effect of further purchases on bond yields could increase substantially. This potential nonlinearity reflects the existence of a large class of bond investors whose demand is probably relatively inelastic with respect to yields. Evidence on the effects on private yields is less well developed. While it is generally agreed that supply-induced reductions in Treasury yields would lower private yields, there is less agreement on the size of the reduction.

Operationally, large-scale purchases of Treasury notes and bonds could be conducted in a manner similar to current practices for outright operations. However, the selection criteria and operational frequency could be affected by whether or not the Federal Reserve set explicit rate goals for these purchases.

Operating Objectives

The operating objective for a policy tool of large-scale purchases of longer term Treasury securities could take one of several different forms. The Federal Reserve could simply announce its intention to purchase a large quantity of longer-term Treasury debt

¹ Cabana, Forster, Frost, Hilton, Rodrigues, Steinberg: Federal Reserve Bank of New York; Gagnon: Division of Monetary Affairs.

² This range is based on purchases spread evenly across securities with maturities greater than two or three years. If purchases were concentrated at the longest maturities, the effect on the 10-year yield would be somewhat higher, but there would probably be proportionally less effect on medium-term yields.

over some specified period of time. It might also indicate a cumulative total of such purchases, and provide some guidance about how purchases might be distributed across the maturity spectrum. Policymakers might have some rate objectives in mind, but wish to remain noncommittal, at least publicly, about achieving any particular rate outcome. Alternatively, explicit rate pegs or ceilings at different maturities could be announced.

Use of either explicit rate pegs or ceilings (“rate targets”) would introduce several additional considerations and challenges. Rate targets might be set across the entire yield curve, or established just for specific issues or maturity ranges. Special challenges likely would exist in keeping market rates in line with their target around any point of discontinuity in the structure of announced rate targets. Selection of rate targets may need to take account of both investors’ expectations for the path of future short-term rates as embedded in longer term yields and of the Committee’s objectives. The effectiveness of even large-scale purchases on rates could depend on whether they are designed only to reduce positive term or risk premiums or to go further and maintain longer term rates below the expected path of future short-term rates. And the role of Treasury’s inflation-indexed securities in a regime with explicit bond rate targets would need to be handled particularly carefully. An expected exit date from rate targets (whether announced or just widely perceived), or even market expectations about possible changes in such targets, could confound operations to maintain market rates around their targets.

In this discussion, we do not consider all the possible implications of the various operating objectives policymakers could adopt in the context of large-scale purchases of longer term Treasury debt. This discussion assumes policymakers have not made any pre-commitments about the path of future short-term rates, and so outright purchases as a tactical device to reinforce such a commitment on the policy path are not addressed here; that possibility is discussed in Note 20.³

We also consider only briefly the role of other operational forms, e.g., the sale by the Federal Reserve of options on Treasury securities. Finally, we assume that short-term interest rates would be at the zero bound if this strategy was implemented, and so sidestep the issue that limits on the level of excess reserves could constrain the scale of outright purchases of longer term Treasury securities.⁴

Evidence on the Efficacy of Purchases of Long-Term Treasury Securities

At the zero bound on short-term nominal interest rates, Federal Reserve liabilities—currency and bank reserves—are likely to be close substitutes for short-term Treasury bills. All of these assets would yield a zero nominal rate of return and would be completely free of default risk and highly liquid. In this circumstance, purchasing long-

³ Even if this strategy were not accompanied by any FOMC statements about the future path of short-term policy rates, large-scale purchases of longer term Treasury securities could influence market expectations about the future policy path. While this possibility is certainly plausible to some degree, the size of any impact is difficult to anticipate. In this note we do not consider the possible impact that these purchases could have on longer-term interest rates operating through this mechanism.

⁴ Note 15 discusses possible effects of large quantities of excess reserves operating through the banking system.

term Treasury securities via reserve creation may have a similar effect on the yield curve as issuing Treasury bills to purchase long-term Treasury notes and bonds. There is a substantial literature on the effects of the Treasury maturity mix, or debt management, on the slope of the yield curve. We turn to this literature to gauge the likely effects of this nonstandard policy tool.

In principle, changes in the maturity mix of Treasury securities held by the public could affect the yield curve by changing expectations of future short rates. However, studies generally find little evidence of such moves. Indeed, one of the most recent and comprehensive studies found a slight tendency for *ex post* future short rates to move in the opposite direction.⁵ Thus, the studies appear to be capturing effects operating through term premiums arising from the “habitat” preferences that investors have for certain securities.

A metric we use to summarize the historical evidence is the elasticity of the term spread with respect to changes in the share of long-term Treasury debt out of total Treasury debt. Studies uniformly find that the effects on term spreads are greater at longer maturities. Studies use different measures of the maturity mix, but the broad conclusions do not appear sensitive to these differences. To the extent possible we have tried to convert reported results into a canonical elasticity defined as the reduction of the 10-year to 3-month yield spread in basis points for every percentage point decline in the share of total Treasury debt composed of securities with maturities greater than 2 or 3 years. We focus on long-term responses whenever possible.

There are two broad categories of studies: time-series analyses and event studies. Within the time-series category, studies differ greatly in terms of the theoretical structure they impose on their estimates. Relatively unrestricted estimates often are large, but generally appear to lack robustness to modest changes in methodology or sample period. More restricted estimates, generally based on the Capital Asset Pricing Model as in Frankel (1985), tend to be smaller but more robust, although the restrictions are generally rejected by the data. Also important is the sample period. Studies with sample periods that have significant shifts in the Treasury maturity mix generally find estimates that are more statistically significant.⁶ Overall, the estimated elasticities from the studies that appear most reliable are in a range from 2 to 10 basis points.

Event studies examine yield curve movements in narrow windows around news announcements that provide information about the future maturity pattern of Treasury securities.⁷ For the United States, there are three events that have received particular attention: 1) the February 2000 Treasury announcement that it would buy back certain long-term securities, 2) the October 2001 announcement that the 30-year Treasury bond

⁵ Greenwood and Vayanos (2008, p. 2).

⁶ Studies of Operation Twist in the 1960s generally did not find statistically significant effects, most likely because there was little movement in the maturity mix over this period.

⁷ In general, estimates from event studies suffer from a potential downward bias because markets may anticipate announcements to some extent and because the full market reaction may take longer than the observation window.

would be discontinued, and 3) the October 2008 announcement that certain long-term securities would be reopened. None of these announcements was anticipated by the market nor appeared to contain any new information on future fiscal deficits or the future path of short-term rates. The first two announcements caused long-term rates to fall and the third announcement caused long rates to rise. To get an estimated elasticity from these events requires an assumption about the views of market participants concerning the likely size of the future supply shifts. Based on a range of plausible assumptions and focusing on 10-year yields, one can obtain a range of elasticity estimates from 1 to 7 basis points for the first two events and 4 to 40 basis points for the third event. The larger estimates for the 2008 event may reflect the greater market turbulence in 2008 compared to 2000 and 2001.⁸

There are some empirical studies that do not fit well into the two broad categories described above. Although these generally do not yield elasticity estimates, they do agree that a policy of purchasing long-term Treasury securities is likely to lower long-term Treasury yields. Hanes (2006) shows that monetary expansion via gold purchases in the 1930s—when short-term rates were at the zero bound—tended to lower long-term Treasury yields. By logical extension, a monetary expansion to purchase long-term Treasuries directly should have an even greater negative effect on long-term yields. Note 2 documents that large-scale Fed purchases of long-term Treasury securities were successful in holding down long-term yields in the 1940s, but this success occurred in the context of a widely perceived commitment to maintain a ceiling on Treasury yields, including on future short-term rates.

A limitation of these studies is their reliance on historical movements in the maturity structure of Treasury debt. If the Federal Reserve were to engage in a scale of purchases that was unprecedented, causing the share of long-term securities in the hands of the public to fall below levels previously experienced, it could have an effect on yields much greater than suggested by the historical experience. In addition to the scale of purchases that could be contemplated, this possibility partly reflects the emergence of an important class of Treasury investors who arguably are less sensitive to market yields, in particular foreign central banks and other foreign official investors. Inducing these investors to sell their securities to the Federal Reserve would likely require relatively large movements in yields. Currently, foreign official institutions are estimated to hold approximately 50 percent of the \$1.7 trillion of nominal Treasury securities in the hands of the public that have remaining maturities in excess of 3 years. If large-scale purchases of longer-term debt by the Federal Reserve were heavily concentrated amongst holdings by other types of accounts, the effects on longer-term yields could be even greater than is suggested by the historical estimates.

As discussed in Note 7, the Bank of Japan (BOJ) was apparently successful in lowering long-term Japanese government bond (JGB) yields during a period in which it

⁸ The speech by Chairman Bernanke on December 1, 2008 mentioned the possibility of purchasing long-term Treasury and agency securities. In the hour after the speech was delivered, 10-year Treasury yields fell 11 basis points. This effect likely does not reflect expectations of lower future short-term rates, as 2-year Treasury yields were unchanged.

stepped up its purchases of JGBs. However, there were other elements of the BOJ's strategy that may have contributed to this effect—such as its announced policy of keeping its policy rate low for an extended period of time—and so it is difficult to separately identify the effect of long-term bond purchases. It is also worth noting that 10-year JGB yields during this period were close to 1 percent, around 200 basis points lower than current 10-year yields in the United States. This difference is potentially important, given that the ability to push bond yields down further probably diminishes as they approach zero because the risks of capital gains and losses become skewed toward losses.

The effectiveness of this policy tool at providing macroeconomic stimulus hinges critically on the response of long-term private yields to any induced decline in long-term Treasury yields. A number of the papers that looked at supply effects on the Treasury yield curve also considered the implications for corporate bond yields and equity prices. Based on the strong historical correlation between Treasury yields and corporate yields, these studies generally concluded that corporate yields would decline by 80 percent or more of any decline in Treasury yields. The effect on equity prices, through lower expected holding yields, was viewed as positive but small, reflecting the weak correlation between Treasury yields and equity yields in the data. In the three Treasury market events of 2000, 2001, and 2008, corporate bond and mortgage-related yields moved about as much as Treasury yields.^{9 10}

Finally, some uncertainty exists about whether the eventual cumulative size of purchases needed to achieve a particular effect on longer term yields would be less if the Federal Reserve were to announce longer term interest rate objectives, including explicit interest rate targets, and assuming market participants were convinced of the Federal Reserve's resolve to achieve those outcomes through outright purchases as needed. There is little question that an announcement effect could by itself induce at least some portion of the desired interest rate movements ahead of any actual purchases. But it is doubtful as to whether these interest rate effects could be maintained without actual follow-up operations. Yields on longer term Treasury assets will be determined by their supply relative to available supplies of other assets that serve as imperfect substitutes in the portfolio. And without an actual change in relative portfolio amounts, relative yields would likely drift back towards their previous state in the absence of actual buying by the Federal Reserve.¹¹

⁹ Long-term swap rates also moved in line with long-term Treasury yields immediately after these events. However, Bernanke, Reinhart, and Sack (2004) note that long-term swap spreads widened several weeks after the February 2000 event and remained wide for more than a year, suggesting that the pass-through of lower Treasury yields to private yields was not permanent. This pattern of offsetting movements in private yield spreads did not occur in the weeks after the other two events.

¹⁰ Krishnamurthy and Vissing-Jorgensen (2007) find a strong negative effect of Treasury supply on the spread of corporate bond yields over Treasury yields; they speculate that this effect reflects a special liquidity demand for Treasury securities. If the reserves created to purchase long-term Treasuries do not satisfy this liquidity demand, these results imply that corporate bond yields will not decline very much. However, the Krishnamurthy and Vissing-Jorgensen results are difficult to reconcile with the results of other studies.

¹¹ The analogy is sometimes made with how the Federal Reserve had (prior to the recent period of high excess reserves) maintained control over its policy target, the overnight federal funds rate, by announcing a change in target and without the need for follow-up operations to affect reserve supply. The analogy is

Implementation Issues

Operationally, outright purchases of Treasury notes and bonds as part of a program of large-scale acquisitions would be conducted in a similar fashion to current outright purchases, e.g., using the same trading systems, operating through primary dealers, focusing on particular segments of the yield curve in any single operations, but perhaps adapting the selection methodology to different operating objectives. If the Federal Reserve had as an objective acquiring a large share of total outstanding longer-term Treasury debt but without definite rate objectives, the selection methodology could closely resemble current practice which evaluates propositions relative to current market yields. With explicit rate objectives, propositions might instead be accepted according to which bids are cheapest to those targets. Even in this case the Federal Reserve would need to decide whether to operate more or less continuously as long as yields were away from their rate targets, or whether the timing and choice of each operation size were to remain discretionary.

The sale of put options on Treasury notes and bonds might be an effective complement to outright purchases as a way of helping lower longer-term Treasury yields. The underlying instrument would likely be a basket of Treasury issues instead of a specific issue to minimize distortions across the yield curve. Use of options, however, would introduce more operational complexity into the program. Moreover, options would necessarily specify a strike price which, in the absence of announced rate targets, would likely be interpreted as being an explicit rate objective of policymakers.

With short-term rates at the zero bound, operational issues associated with having to sterilize reserves created through purchases are avoided. Moreover, use of this instrument could be more effective because it could be employed on a larger scale than otherwise. However, operational issues associated with the exit strategy and restoring the portfolio to its steady-state size and composition are compounded. Alternatively, if there were a desire to sterilize the reserve effects of outright purchases of Treasury securities, one option could be to use the acquired securities as collateral in reverse repurchase agreements (RRPs) arranged by the Trading Desk. Draining excess reserves in this way could be a way to limit the impact that a program of outright purchases would have on leverage ratios of banking institutions.¹² In practice, however, it could be difficult for the Desk to arrange RRP of sufficient size to sterilize the reserve effects of large-scale purchases. The current set of counterparties to the Desk's open market operations, the primary dealers, ordinarily need financing and themselves wouldn't be the holders of the excess reserves. This problem could be addressed by arranging the RRP with banks directly, but if the general financial environment were characterized by short-term

flawed, however, because the demand for reserves is essentially fixed (also by the Federal Reserve) through the structure of reserve requirements, unlike the demand schedule for Treasury assets which is assumed to be downward sloping.

¹² As discussed in Note 15, a decline in the leverage ratio under some circumstances could inhibit bank lending. Of course, sterilizing excess reserves would also undo any possible beneficial effects that might be associated with an expansion of excess reserves when at the zero bound on interest rates.

interest rates at or near zero, banks might have little incentive to participate in short-term funding operations that offer no yield advantage over holding excess reserves.

Additional Considerations of Federal Reserve Purchases

Impact on Foreign Official Investors

Large-scale purchases of Treasury securities by the Federal Reserve would result in the movement of funds into other asset classes as the previous owners of these Treasury securities reinvested their funds. While it is difficult to know into what assets these displaced funds would be invested, private sector investors would likely shift a large portion into other similar, but higher-yielding, assets such as agency debt, agency MBS, investment-grade corporate debt, or other highly-rated private debt instruments. In this way, purchases of Treasury debt by the Federal Reserve would begin to affect yields more broadly—a necessary result for this strategy to have a noticeable effect on aggregate demand.

As noted previously, the likely response of foreign official holders of Treasury securities to a program of large-scale purchases of Treasury debt is of particular interest, given that these investors currently hold such a large portion of total outstanding Treasury debt. Their reaction could be somewhat different than the stylized response just described. Total foreign official holdings are estimated to equal approximately 40 percent of outstanding marketable Treasury debt, compared to just under 10 percent for SOMA holdings (Table 1).¹³ Foreign official accounts largely tend to be buy-and-hold investors, and so would be less likely to be sellers directly to the Federal Reserve, and less likely to adjust their holdings in response to movements in Treasury yields relative to other rates. Thus, large-scale Federal Reserve purchases would predominantly affect holdings of investors that collectively possess about half of the total outstanding debt.

Impact of Increased Treasury Issuance

At present, Treasury faces unprecedented financing needs in upcoming years, with estimates suggesting that marketable Treasury debt may need to expand by over \$2 trillion in FY2009 alone as a result of various fiscal initiatives and revenue implications of a projected slowing economy. The maturity distribution of new Treasury debt issuance, the distribution of new issuance between account holders with different sensitivities to movements in Treasury yields, and the implications of any new supply for the level of rates are unknown. These sources of uncertainty do not suggest that large-scale purchases of Treasury debt by the Federal Reserve would necessarily be any less effective than under normal circumstances, but they do increase the uncertainty about the likely rate impact that large-scale purchases of longer-term Treasury securities would have on yields, and would present particular challenges to selecting any explicit rate objectives for such a program.

¹³ The values for foreign holdings in Table 1 are based on TIC-reported transactions, and are believed to represent lower-bound estimates of actual foreign official holdings. These include holdings by Foreign and International Monetary Authorities (FIMA) that maintain accounts at the Federal Reserve Bank of New York, which are estimated to represent about 75 percent of the total.

Impacts on the Federal Reserve

Large-scale purchases would almost certainly require overhauling current internal portfolio guidelines, which limit SOMA ownership to 35 percent of the outstanding supply of a given issue. Because it would be difficult to know *ex ante* how much of any given issue will be purchased to meet policy objectives, these limits may need to be entirely suspended. When the larger holdings begin to mature, rollover guidelines would have to be re-evaluated to avoid large redemptions, which would be problematic for Treasury's cash management purposes. An increase in the SOMA portfolio would benefit some current policy tools by providing greater capacity for some programs (including reverse repos and the Term Securities Lending Facility) and by providing more supply to lend via SOMA's daily securities lending program. At the same time, this could create some uncertainty in longer term financing transactions for single issues, as investors would not know how much of a given security would be available in the open market or through the Federal Reserve via its securities lending program. The program's wind-down could also create dislocations in the market, depending on its pace, especially if large sales of longer term Treasury securities are needed. Large-scale sales of Treasuries also open the SOMA up to potential capital losses, as securities purchased at high premiums could very well be sold at a loss.¹⁴ The extent of any losses is likely to be positively correlated with the success of the overall program at encouraging growth and avoiding deflation. Any future losses would be offset at least partially by higher profits in the near term from the expanded Federal Reserve balance sheet and its positive net interest margin.

Impact on Market Liquidity

Treasury market liquidity could be impaired if the Federal Reserve wound up purchasing a substantial amount of the floating supply of a number of issues (although this outcome may be less likely in general in view of expected increases in total supply). As market participants learned of the reduced supply that could be held on an outright basis, this would increase the scarcity premium for individual securities in high demand and could potentially lead to elevated failures to deliver in these issues. While SOMA would have more supply to lend to help to mitigate these fails, reduced outright supply held in private hands could still lead investors to avoid these issues. However, the Federal Reserve may be able to avert these situations through its selection of individual issues to purchase.

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¹⁴ Private sector holders of longer-term Treasury debt would also be exposed to potential losses during the unwinding of a strategy for the Federal Reserve to acquire longer-term Treasury securities.

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Table 1

Holdings of Marketable Treasury Securities
(billions of dollars)

Remaining Maturity	SOMA*	Foreign Official**	Total Outstanding***
0 – 3 months	37	276	1222
3 – 6 months	27	179	460
6 – 12 months	40	221	489
1 – 3 years	91	552	889
3 – 6 years	77	461	694
6 – 11 years	80	341	578
11+ years	78	67	433
TIPS	41	N/A**	536
Total	470	2097	5301

* SOMA holdings are as of November 21, 2008

** TIC-based estimates as of end-November 2008. TIPS are estimated to comprise about just 2 percent of Foreign Official holdings and are included in the corresponding maturity bucket.

*** Total Outstanding values are as of October 31, 2008