October 13, 2010

Strategies for Targeting Interest Rates Out the Yield Curve[1]

This note examines strategies for targeting intermediate- and long-term interest rates when short-term interest rates are at the zero bound. The focus of the note is on approaches that would use outright purchases of Treasury securities to achieve rate objectives. The note also considers briefly the possibility of using options to help place a ceiling on market rates and reinforce approaches to reduce market rates.

Interest-rate targeting offers both benefits and risks. Benefits include the potential to reduce both the level and volatility of interest rates, and thereby to provide stimulus to economic activity and bring the yield curve closer to that which policymakers might regard as desirable given prevailing economic conditions. In addition, in conjunction with clear communication of the interest-rate targets, yields could decline due to signaling effects, tending to lower the magnitude of purchases required to keep interest rates near target. However, interest-rate targeting also entails some risks. If targets are not adjusted frequently enough to account for changing macroeconomic conditions, interest-rate targeting can induce substantial volatility in central bank securities holdings and have a destabilizing macroeconomic effect. The Federal Reserve was confronted with these problems following both World Wars as a consequence of its policy of pegging the prices of U.S. government securities.

As usual, the devil is in the details, and hence this note focuses on several key choices required to put an interest-rate targeting approach into operation. These include how far out the yield curve to target and how much deviation between market rates and the target to allow. In making these choices, there is a tradeoff between the expected benefits that can be achieved in terms of economic stimulus and the potential risks, including complications for exit from these targeting approaches. A couple of important implications of our analysis can be summarized as follows:

Targeting Horizon Targeting yields at short- and intermediate-term horizons is attractive on several grounds. First, given the soft economic outlook, short-run targets probably wouldn't have to be adjusted frequently or sizably in the near term, even in response to favorable macroeconomic shocks; second, the shorter duration of securities purchased would ease exit problems; and third, policymakers may find it easier to achieve consensus over appropriate short-run targets. Of course, given that short-term interest rates are already very low, targeting rates at longer horizons could provide more stimulus to the economy. However, the benefits of doing so would have to be weighed against larger potential balance sheet risks and a greater need to adjust targets in response to the evolving outlook.

[1] Prepared by David Bowman, Christopher Erceg, and Mike Leahy, with contributions from William English, Edward Nelson, David Reifschneider, Nathan Sheets, and David Wilcox of Board staff and Brian Sack, Spence Hilton, Allan Malz, Frank Keane, Matt Raskin, Julie Remache, Josh Frost, Nate Wuerffel, Angela O'Connor and Richard Dzina of FRBNY staff.

Hard vs. Soft Targets Under a "hard" target operations are designed to keep yields continuously at desired levels, while under a "soft" target they would be adjusted on a periodic basis to narrow the gap between actual and desired yields. Although the former is attractive to the extent that it can potentially reduce uncertainty about yields, it carries substantial risk as the targeting horizon lengthens. Risks include the possibility of a large increase in the size of the Federal Reserve's balance sheet in response to perceptions that a discrete adjustment in target is imminent and the possibility of significant capital losses for the central bank.

The note continues in the following section with a brief review of the Federal Reserve's large-scale asset purchases (LSAPs) program to date, including a description of the channels through which the purchases may have lowered interest rates and their estimated effect on long-term interest rates and real activity. The next section examines in some detail the possibility of targeting interest rates. Issues addressed include a comparison of interest-rate targeting and LSAPs as monetary policy tools; a discussion of three different approaches to interest-rate targeting, all based on outright purchases of securities; and an examination of the exit complications that can arise with each approach along with some partial remedies. The final section considers how the use of options might complement an interest-rate targeting program.

Large-Scale Asset Purchases (LSAPs)

Between December 2008 and March of 2010, the Federal Reserve purchased $1.7 trillion of agency debt, agency mortgage-backed securities (MBS), and Treasury securities. These purchases were intended to "provide greater support to mortgage lending and housing markets" and to "help improve conditions in private credit markets."[2] The primary objective was to reduce yields on long-term securities, and thus the Desk's purchases were focused on longer-term assets, with the MBS purchases composed of newly-issued 30-year fixed-rate securities and roughly two-thirds of the Treasury purchases having maturities exceeding 4½ years.[3]

In theory, the purchase of longer-duration assets can lower yields through several channels. One channel is through a reduction in the term premiums required to induce investors to hold long-duration assets with fixed nominal yields. Because LSAPs remove assets of a given duration from the market, investors may be willing to pay a higher price for remaining assets of the same type and for close substitutes, thereby driving down term premiums. A second channel is through a reduction in the expected path of short-term interest rates: The purchase of longer-term assets may be seen as signaling a longer-term determination on the part of the central bank to provide policy stimulus. A third channel is through liquidity premiums. Under turbulent market conditions (as in 2009), the willingness of a central bank to purchase particular classes of assets can boost their perceived liquidity and lower the premium investors would otherwise require to hold illiquid securities.

[2] March 18, 2009, statement by Federal Open Market Committee.
[3] Of course, the effective maturity of the MBS holdings was seen as substantially less than 30 years, given the possibility of prepayment.

Because effects through these channels can be anticipated, a credible announcement of an LSAP program should have an immediate effect on asset prices in the targeted classes and of close substitutes. The size of the effect depends on the size of the proposed purchases and the length of time the assets purchased are expected to be held off the market.

Empirical analysis indicates that the Federal Reserve's LSAP program reduced the yields on Treasury and private securities substantially. Drawing on the estimates reported in Gagnon, Raskin, Remache, and Sack (2010) of the effects of the LSAP program, Board staff currently assumes that a $500 billion purchase of longer-term securities would lower *term premiums* on long-term Treasury and private securities by about 15-20 basis points.[4] Of course, the effects on long-term yields would be even larger to the extent that the asset purchases induced market participants to forecast a lower path for the federal funds rate.

Large-scale asset purchases stimulate economic activity through several related channels. First, the lower interest rates reduce borrowing costs for firms and households, including on mortgages and other types of household debt. Second, asset prices rise, which boosts consumption through the wealth effect and helps ease borrowing constraints. Third, the dollar depreciates, boosting net exports. Fourth, aggregate spending may be spurred through confidence effects. Simulations of the FRB/US model suggest that a $500 billion purchase—operating exclusively through a reduction in the term premium—would boost the level of real GDP between about ½ and ¾ percent after two years, roughly equivalent to cutting the federal funds rate by ¾ percentage point. The GDP effects would be even larger if the asset purchases caused private agents to expect a lower federal funds rate path due to a signaling effect, or if the purchases buttressed household and business confidence through channels not explicitly modeled.

Targeting Interest Rates out the Yield Curve

An alternative approach to providing additional monetary stimulus would be to target lower yields directly, committing to purchase securities in whatever quantity is needed to achieve the desired target rate. This section considers policy and operational issues associated with the use of explicit interest-rate targets.

[4] This assumed effect is roughly consistent with the midpoint of the range of estimates reported in Gagnon et al. In particular, this study—which employed both event studies and regression analysis—suggests that the decision to purchase $1.7 trillion in longer-term assets cumulatively depressed the term premium on long-term Treasury and corporate securities by 30 to 80 basis points in 2009, with a preferred estimate of 50 basis points; and the program likely lowered the term premium on agency MBS by 50 basis points. Not surprisingly, there is a considerable degree of uncertainty about these estimates. For example, even the point estimates reported in Gagnon et al imply that the effect of purchasing an additional $500 billion of longer-term securities on the term premiums on Treasuries ranges from 9 to 24 basis points. Moreover, the point estimates are themselves uncertain, implying that the confidence interval on the LSAP effect is even wider than the range of point estimates.

Comparison of interest-rate targeting and LSAPs

In many respects, interest-rate targeting and LSAPs are similar. Figure 1 illustrates conditions under which these approaches are in fact equivalent. In particular, assuming that the demand schedule for a given-maturity Treasury security is stable and known to the central bank – the downward-sloping solid line – the central bank could achieve its target for the security price equally well under either policy. Suppose that the initial equilibrium is at point A, and the central bank would like to boost security prices to point B. Under interest-rate targeting, the central bank would announce its target (the horizontal dash-dotted line) and purchase all securities that the private sector wished to sell at that price; while under a quantity approach, the central bank would use its information about the demand schedule to determine the level of purchases required to boost prices to the target level. Either approach would work by moving up the demand schedule from point A to point B, reducing the quantity of securities held privately (by the horizontal distance between the points) and boosting their price (by the vertical distance).

Nonetheless, these two approaches differ in some potentially important ways. With respect to implementation of policy, interest-rate targeting achieves greater certainty about the interest rate that will result from the policy, relative to LSAP operations, at the expense of greater uncertainty about the quantity of securities that will be added to the central bank's balance sheet. As illustrated in Figure 2, a shock that shifts down the demand schedule for securities (that is, puts upward pressure on Treasury yields) would automatically be accommodated at an unchanged interest rate by increased central bank purchases under an interest-rate target (measured by the horizontal distance between C and B). By contrast, under an LSAP approach in which purchases are invariant to the shock, the security price would drop to point D and the yield would of course rise correspondingly. Moreover, uncertainty about the slope of the demand schedule would not necessarily impair the central bank's ability to achieve a price target, provided that it had latitude to adjust its balance sheet as required.

A consequence of this feature of interest-rate targeting is that it would help insulate the economy from shocks to the demand for securities arising from, say, fluctuations in risk aversion, whereas such fluctuations would show through to market rates under an LSAP approach.[5]

While interest-rate targeting gives a central bank less latitude to control the quantities of securities in its portfolio, a well-designed approach has the potential to reduce the magnitude of purchases required to keep interest rates near desired levels. In particular, a strategy that lays out an interest-rate target may communicate more clearly and with greater credibility the expected future path of the funds rate and may lower risk premiums. This is illustrated in Figure 3, which assumes that the announcement of an interest rate target shifts up the demand schedule for securities. Such an announcement is likely to be seen as highly credible, given the capacity of

[5] Poole (1970) finds similar results in his study of optimal choice of monetary policy instruments.

the Federal Reserve to make essentially unlimited purchases at the target rate. As a result, the same interest rate as obtained under an LSAP may be achieved with a smaller level of purchases. Moreover, the greater certainty about interest rates that may come from interest-rate targeting may in turn deliver a stronger boost to spending if it allows businesses and consumers to make spending plans with more confidence.

Interest-rate targeting may constrain how interest rates respond to macroeconomic shocks in a way that amplifies the effects of real shocks relative to a policy – such as an LSAP – that allows greater adjustment. In the current environment, this potential difficulty of "insufficient reactivity" to macro conditions would probably not apply to negative real shocks: Rate targets would likely be interpreted as ceilings, and interest rates would be allowed to decline in response to such shocks. By contrast, the stimulus to GDP from positive shocks would probably be larger under interest-rate targeting, especially if a longer-term interest rate were targeted.

Three approaches to interest-rate targeting

In this section, we outline three possible approaches to targeting interest rates: a policy signaling approach that targets a range of interest rates over the short-to-intermediate portion of the yield curve, an incremental approach that begins at the short end of the yield curve and moves out in steps as needed, and an approach that targets a long-term interest rate.

Policy signaling approach. The policy signaling approach would seek to cap at low levels interest rates on all Treasury securities that mature during the period over which the Committee expects to keep the federal funds rate near zero. For example, if the Committee expected to begin raising its target for the federal funds rate in mid-2014, it could announce a target that capped interest rates at 25 basis points on all Treasury securities that mature on or before June 2014. This approach could be used if the Committee sought to clarify its expectations regarding the "extended period" over which the federal funds rate was likely to be at an exceptionally low level and thereby guide private-sector expectations for monetary policy more precisely. In addition, it could be used to reinforce the Committee's commitment to keeping the overnight rate low. If monetary policy evolves as expected, the range of targeted interest rates shortens with the passage of time, ultimately reverting back to the overnight rate just as the Committee anticipates it would begin raising the target for the federal funds rate.

Determination of the maturity range to be targeted might be guided in the current environment by model simulations of optimal monetary policy subject to the zero bound constraint. For example, in the September 2010 Tealbook, optimal policy simulations show the nominal federal funds rate essentially flat at its effective lower bound until mid-2014. If the Committee judged these projections to be acceptable, it might wish to adopt the cap, described above, of 25 basis points for interest rates on all Treasury securities that mature on or before June 2014.

At present, targeting the federal funds rate in a range of 0 to 25 basis points, along with the liquidity injections associated with LSAPs, the settings of rates on the standing facilities, and the FOMC's communications, has left Treasury bill rates out through one year very close to the zero bound (25 basis points or less). Yields on Treasury securities with maturities of 4 years are higher, currently a bit below 1 percent. Thus, setting a cap of 25 basis points would most likely bind in the maturity range of two-to-four years, flattening that part of the yield curve. Initial asset purchases needed to enforce the cap would also most likely be in that maturity range.

If the future unfolds as anticipated, assets on the Federal Reserve's balance sheet will run off in line with the expected withdrawal of policy stimulus. In that way, liquidity injected by the interest rate targeting would be drained ahead of the time policymakers anticipate raising the target for the federal funds rate, and no assets acquired from the operation would be left on the balance sheet to generate a capital loss. Thus, even if substantial quantities of Treasury securities had been purchased during the interest-rate targeting program, under this scenario where the future unfolds as anticipated, the Federal Reserve faces no obvious complications in executing its exit from interest-rate targeting.

However, substantial purchases do carry risks that can materialize when the future does not unfold as planned. If incoming data were to show that the recovery is occurring faster than had been anticipated, the Committee may wish to raise its target for the federal funds rate earlier than previously planned. In that case, some of the assets acquired by the Federal Reserve during previous targeting operations would still be on the balance sheet after policy rates started moving higher. This overhang implies, all else equal, that not all the liquidity provided by the targeting operations will have been drained by the time policy rates start moving higher. Such an outcome would require the Federal Reserve to rely on short-term reserve draining tools to guide interest rates higher. It could also impose financial costs: If low-yielding securities were held to maturity in a rising rate environment, the interest income on the securities would not cover the interest paid on the corresponding reserve balances. Alternatively, if it were decided that sales of securities were needed to bolster the policy operations, the Federal Reserve would incur capital losses. The magnitude of these costs would depend on the remaining maturities of the securities, which are likely to be fairly short, and the pace of tightening.

These costs could be magnified if the Committee did not adjust its target for the interest rates on Treasury securities when market expectations shifted. Once expectations develop that the FOMC will not maintain its cap on rates at the longest maturities it is targeting, investors will seek to unload those securities at the target rates before the rates are increased or withdrawn. Thus, a standing facility that did not adjust continuously to incoming information and shifting market expectations could expose the Federal Reserve to more substantial balance sheet increases and greater potential costs.

One way to mitigate the risk of slow adjustment of targets would be to enforce the Committee's targets using a target band. Such a band would combine two types of operations:

open market operations done at the initiative of the Desk, to attempt to keep targeted interest rates near 25 basis points, and purchases done in a standing facility at the initiative of market participants, to keep rates from exceeding rate caps established by the Committee. These caps could be set progressively higher as the term of the targeted interest rates increased. For example, the Committee might announce a target rate of 25 basis point for Treasury securities that mature on or before June 2014 as well as a cap of 25 basis points for interest rates on all Treasury securities that mature on or before June 2012, a cap of 50 basis points for all that mature after June 2012 but on or before June 2013, and a cap of 75 basis points for all that mature after June 2013 but on or before June 2014. A strategy of setting caps provides scope for interest rates to move somewhat above target as expectations emerge that the target might be raised or withdrawn, and gives the Committee some time to assess the need to revise its target. The progressively higher caps allow for more variability at points closer to the anticipated date of lift off for the federal funds rate. As long as the difference between the target and the cap is wide enough to accommodate most shifts in expectations, interest rates will normally stay below the cap, and the Desk is unlikely to be flooded with offers of securities at the standing facility. By using open market purchases conducted at its own initiative to try to drive the rate down to the target, the Desk retains some control over the pace at which the Federal Reserve's balance sheet might expand.

An alternative implementation strategy that could mitigate the risk associated with slow adjustment would be to establish a standing facility in which the Committee directs the Desk to conduct purchase operations only once during each intermeeting period, as early as possible after each FOMC meeting. On the single day of operations, the Desk would stand ready to purchase any and all targeted Treasury securities offered to it at prices consistent with the target interest rates. Once that day had passed, the targeted interest rate could fluctuate freely with market developments and would not be controlled until immediately following the next policy meeting, at which the Committee could decide to adjust the target in light of its current understanding of policy requirements. Such a strategy would minimize the possibility that news affecting views about monetary policy would arrive during the interval between a policy decision and the Desk's operations and would thereby prevent the execution of policy directives that the Committee would like to revise.

This strategy does not rule out the possibility that investors will want to sell large quantities of securities to the Federal Reserve during one of the targeting operations, particularly if investors believed that the price offered by the Fed would be better than might be available in the future. Moreover, concentration of a large volume of sales into one day could be disruptive to market functioning. Accordingly, the Committee will want to assess investor appetite for selling securities and judge its willingness to absorb a run-up in the size of the Federal Reserve's balance sheet before setting the terms of upcoming purchase operations.

Incremental approach. The incremental approach begins with setting interest-rate targets at the short end of the yield curve and moves out in steps as needed. Like the policy signaling

approach, the objective is to cap interest rates on Treasury securities at low levels, consistent with the low level of current and prospective federal funds rates. Unlike the policy signaling approach, the maturity of the securities targeted is not intended to signal the length of the "extended period," at least initially. Rather, the incremental approach attempts to signal a less specific commitment to keep short rates low. Policymakers may feel more comfortable setting explicit targets for near-term rates, perhaps because they have a clearer view of desired near-term rates than they do of intermediate- or long-term rates. In addition, because central bank experience with targeting interest rates other than the overnight rate is limited, moving incrementally may be viewed as a prudent approach to discovering how far out the yield curve targeting operations would need to occur to achieve the desired effect on the economy.

The first step of this incremental approach might be to set a cap of 25 basis points for interest rates on Treasury securities that mature on or before October 2012, the maturity date of the current two-year note, which has been trading at around 45 basis points. A standing facility could be established to accept offers of securities maturing on or before that date. This facility could be open for business on a daily basis, or it could be open only once immediately following each policy-setting meeting, to address concerns about the pace of adjustment of the target relative to changes in the outlook.

As the two-year rate responds to the targeting operations, rates on Treasury securities further out the yield curve should also move lower. If the effects on the yield curve were seen as sufficient, explicit targeting of interest rates further out the yield curve would not be needed. On the other hand, if the effects were seen as desirable but insufficient, policymakers could subsequently target the interest rate on the note maturing a year later. In this way, steps further out the yield curve could occur as desired to achieve a Treasury yield curve consistent with the degree of stimulus desired by the FOMC.

Like the policy signaling approach, the incremental approach ultimately terminates naturally with the passage of time. Thus, if monetary policy evolves as planned, asset purchases under the incremental approach should have matured and left the Federal Reserve's balance sheet before policy rates start to increase. And even if incoming data foster expectations that the path of interest rates will move up sooner than had been anticipated, exit and balance sheet concerns are not likely to be paramount, because targeting is not likely to have progressed out the yield curve so far that it would involve securities maturing after the Committee anticipates needing to raise the overnight rate from the zero bound. Finally, the same considerations make it less likely that an upward adjustment of market expectations for interest rates that is more rapid than the adjustment of the targets will result in a surge in balance sheet holdings that will still be on the books when the time comes to raise policy rates.

Long-term approach. The third approach would be to target a long-term Treasury yield. The Committee might prefer this approach if it believes that targeting a reduction of longer-term interest rates is likely to stimulate economic activity more directly than targeting a reduction of

short- or medium-term yields, a motivation consistent with the adoption of LSAPs. For example, the FOMC could announce a cap that is 100 basis points below the current yield on the ten-year Treasury security and direct the Desk to purchase securities with yields in excess of the target and maturities within some range around ten years. Unlike the other approaches discussed, this targeting approach has no natural expiration date; presumably, the Committee would leave the targeting strategy in place until economic conditions had improved and it was judged that the stimulus was no longer needed, although adjustments in the cap would likely be needed from time to time if it appeared that the cap was providing too much or too little stimulus or the Federal Reserve was accumulating too many long-term securities.

Targeting under this strategy is likely to add securities to the Federal Reserve's balance sheet that will not have matured when the time comes to start raising policy rate. Thus, the reserve balances created when the securities were purchased will still be outstanding, which could require the use of reserve draining tools to improve control over the federal funds rate. In addition, if the Committee decided to sell these assets to help drain the liquidity, the Federal Reserve might realize capital losses. These losses could be sizable if the amount of assets sold was significant.[6] This strategy is also vulnerable to rapid shifts in market sentiment that could result in the Desk's purchase of undesirably large quantities of long-term Treasury securities in a short period of time unless the Committee adjusted the rate cap. Such surges would magnify the balance sheet problems associated with this strategy.

To prevent surges in the size of the balance sheet, the purchases could be paced: The Committee might announce that the Desk would purchase securities at a maximum pace of, say, $100 billion per month, until the rate target is achieved. This arrangement, which combines an LSAP approach with interest-rate targeting, could achieve most of its interest-rate effects upon announcement of the target, as long as the pace of purchases was seen as sufficient to ultimately achieve the target. While the pace of purchases has an upper bound, the ultimate quantity to be purchased is not known with certainty, and cumulative balance sheet effects could still be large. Even so, because the pace of purchases is controlled by the Desk, this scheme provides some protection against the possibility that the Desk buys a large fraction of the outstanding Treasury securities in the targeted maturity range before the Committee had a chance to revise the policy. Such an approach may also mitigate the risk to credibility as meeting the target is not so clearly the measure of success but rather a conditioning variable that determines whether purchases will continue. A downside of this purchase strategy is that, because achieving the target is less certain, the effect of the targeting approach on market expectations for the path of short rates would likely be weaker.

[6] Any such losses would at first be offset by net income. If the realized losses were to exceed net income, remittances to the Treasury would be halted for a time until net income had cumulated to offset the loss. Indeed, even if the securities were not sold, if the interest rate paid on excess reserves rose sufficiently above the average rate of return on the SOMA portfolio, net income could become negative. However, with roughly $800 billion in currency as a noninterest bearing liability, the rate on excess reserves would need to be substantially above the average return on the SOMA portfolio to result in negative net interest income.

Comparison of interest-rate targeting approaches

These interest-rate targeting approaches present a range of benefits and risks. Under the incremental approach, policymakers would move gradually, with each step out the yield curve requiring only a modest interest-rate adjustment. This approach would also seem to be a natural extension of the practice of targeting the overnight rate, which should help in explaining the policy to the public. After establishing this form of interest-rate targeting, the System would be acquiring securities with the shortest maturities first. Should the Committee decide to begin withdrawing policy accommodation, these holdings could be allowed to run off the System's portfolio relatively quickly. In addition, exposure to balance sheet surges if the outlook improved need not be high if the targeting stops at interest rates with maturities well short of the anticipated lift-off of the federal funds rate.

The policy signaling approach is likely to be seen as more dramatic, which could be useful in a situation where market sentiment might benefit from learning of a bold new proposal to address the weak economy. By providing more precision about the length of time over which policymakers foresee keeping short-term rates near zero, it would likely clarify the forward guidance offered in FOMC statements. It should also have a quicker effect on interest rates further out the yield curve than the incremental approach, since the operation takes a larger step out the yield curve at the outset.

Compared with the shorter-term interest-rate targeting approaches, the key benefit of targeting a long-term interest rate stems from its capacity to work directly on lowering the long-term rate, and thereby delivering policy impetus to the part of the yield curve most likely to influence economic activity. Aside from the declines in term premiums purchases of long-term securities could induce, if the announcement of a long-term interest-rate target conveys a signal that the federal funds rate will be kept low for longer than had been expected, the announcement may help achieve the desired reduction in the interest rate with a smaller quantity of securities purchased compared with LSAPs and disseminate more broadly to yields in other asset classes.

A drawback to the incremental approach is that its capacity to influence longer-term rates may be weak. Even though the incremental approach could lower yields on securities with maturities beyond those it targets, its effectiveness in influencing longer-term yields would likely be smaller than the effectiveness of the other approaches. It is less clear whether the long-term approach or the policy signaling approach would have more effect on longer-term interest rates. The long-term approach would operate most directly on the long-term interest rate, but it might not have significant effects on the expected future path of short rates. The policy signaling approach offers greater capacity to affect expectations for future short rates, which may put downward pressure on interest rates across the yield curve, but its operations are concentrated on securities with short and intermediate maturities.

The balance sheet risks associated with each of these policies likely vary directly with the maturities of the interest rates they target. The average maturity of assets added to the balance sheet would be longest under the long-term interest-rate targeting approach and shortest under the incremental approach, with the policy signaling approach in the middle. Thus, the risk of capital losses when the Committee started to move interest rates higher would likely be largest with long-term interest rate targeting.

The potential magnitude of asset purchases is another risk factor to consider, but it is difficult to estimate with confidence. The next section discusses some of the key factors that could influence the scale of purchases that might be required.

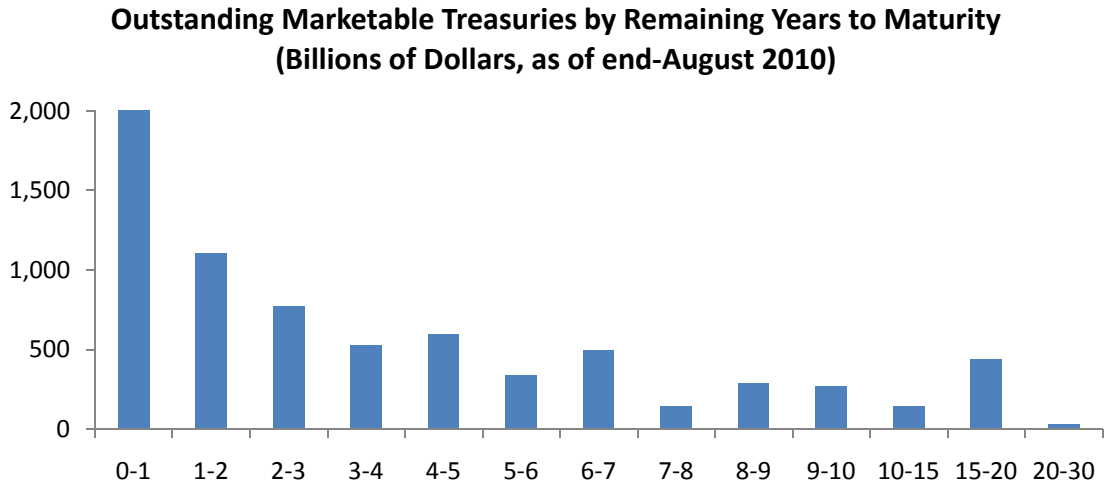
How big might purchases of securities be?

The required volume of securities purchases may depend on the factors causing current yields to be above the levels desired by the FOMC. If, for example, the actual yield is high relative to the desired yield because of misperceptions or uncertainty about policymakers' intentions regarding the time path of short-term rates, a targeting announcement that clarifies these perceptions could prompt the rate to move down without the need to purchase securities in any significant quantity. If, however, the announced target for the Treasury yield is not seen as fully consistent with the expected path of short rates, then more substantial purchases would likely be required. If the term premium rather than the expected interest rate component is holding the Treasury security yield higher than desired, purchases may also be required to remove duration from the market and thereby induce an adjustment to the term premium.

The bar chart below shows outstanding amounts of marketable Treasuries by remaining maturity. As shown in the chart, the majority of Treasuries are at shorter maturities, with approximately $2 trillion of outstanding bills, notes, and bonds with a remaining maturity of one year or less. With yields on these securities already close to zero, targeting them may not require substantial purchases. Securities with remaining maturities of two-to-five years, a sector with yields that are somewhat higher, amount to about $1.9 trillion.

These figures clearly represent an upper bound on the securities the Federal Reserve might need to purchase to target interest rates at the maturities shown. The actual quantity that would need to be purchased could be substantially less, particularly if foreign official holders of Treasury securities, who account for a substantial share of outstanding marketable Treasury debt, are largely buy-and-hold investors and less likely to adjust their holdings in response to changes in interest rates.[7]

[7] As of July 2010, foreign official holdings of Treasury securities were estimated to be $2.7 trillion, of which $480 billion were bills and the remainder notes and bonds. According to the June 2009 Annual Survey Report, approximately two-thirds of official foreign holdings of Treasury bonds and notes were in maturities of 1 to 5 years.



Using Options to Reinforce Interest-Rate Targeting

One way to think about the interest-rate targeting discussed above is that the Federal Reserve has effectively provided all holders of Treasury securities with a free option to sell the targeted set of assets at a strike price that is determined by the interest-rate target for that asset. As an alternative, it might be possible to sell put options into the market, giving purchasers the same rights to sell the targeted securities to the Federal Reserve at a price consistent with the interest-rate target. Such option sales could be used as a stand-alone tool or as a supplement to a program of large-scale asset purchases or of interest-rate targeting.

In addition to allowing the Federal Reserve to collect a premium, the sale of such options could reinforce the effects of interest-rate targeting through its effects on market perceptions about the commitment to low interest rates and about the riskiness of holding targeted securities. In fixing the strike price and the time to expiry of the options, the Federal Reserve may reinforce and clarify its communications to investors about the interest-rate target and the period over which policymakers anticipate interest rates to remain low.[8] Options may reinforce the credibility of policy communications because investors see that the Federal Reserve stands to lose financially if policymakers renege on policy commitments. For example, if interest rate targets were raised before the expiry of the options, option holders would be able to sell securities to the Federal Reserve at a price higher than the cost of acquiring them in the market. This potential transfer from the Federal Reserve to option holders may be seen to align financial incentives for the Federal Reserve with its commitment to keep interest rates low, and the willingness of the Federal Reserve to sell options that create such incentives may enhance market confidence that policy will not change over the life of the option.

[8] The FOMC could consider an alternative to setting a fixed expiration date, instead writing option contracts that expired after the occurrence of some economic event, such as the unemployment rate or inflation reaching a specific threshold. This approach would be unusual, and the contracts would be difficult to price, but could further communicate the conditions under which rates were expected to be kept low.

Another way that options might lower interest rates is through the changes they impose on the market price of interest-rate risk. Selling put options in order to lower the market price of risk is equivalent to removing a portion of the risk distribution from the market, as purchasers of those options acquire insurance against increases in interest rates and corresponding declines in the values of their securities. This change should lower the risk premiums required to hold the protected assets and thereby lower interest rates. It may also lower interest rates on securities that are seen as close substitutes for the protected security.

While using options might enhance the effectiveness of monetary policy, their use would also create some challenges. As a tool to influence market interest rates, options are a novel instrument, and their effects on market rates are likely to be even more unpredictable than the effects of direct purchases of Treasuries. There are a number of legal issues raised by the sale of options that are not yet settled. Significant uncertainty remains about the quantity of options needed to achieve a measurable effect in markets, particularly relative to the small size of the options market; the amount of the premium that the Federal Reserve would actually be able to collect from their sale; and the extent to which the options sold might be exercised.[9] A large quantity of outstanding options could leave a substantial contingent liquidity overhang on the Federal Reserve's balance sheet until they expired. With respect to public perceptions, options would also pose challenges, as some may question whether the Federal Reserve is putting taxpayer resources at risk by conducting monetary policy using a derivative instrument that may be seen as opaque or inappropriate.[10] Operationally, an option program would be challenging to manage given our lack of experience with the instrument. These risks would need to weighed against the potential benefits.

[9] The size of the premium will depend on the credibility of the Federal Reserve's policies. If investors have no doubt that the Federal Reserve will be successful in reducing interest rates, the value of the option will be zero and no one would be willing to pay a premium. On the other hand, if Federal Reserve policy is not expected to be fully credible, the premium would be positive. Even in this case, it is possible that the magnitude of options sold by the Federal Reserve would push prices close to zero.

[10] Explaining the use of options and their effects on economic activity to Congress might also prove challenging. To the extent that a large mutual or hedge fund or a foreign government were to obtain a sizeable amount of options, the Federal Reserve would take the risk that it would have to make potentially large and highly visible payments to these entities should interest rates rise above target, which could be a particularly sensitive issue to Congress and the public. In theory, if one of these entities obtained a large enough number of options, it could have an incentive, and might conceivably have enough market power, to try to actively push interest rates higher by reducing its demand for Treasuries.

Figure 1. Interest Rate Targeting vs. LSAPs

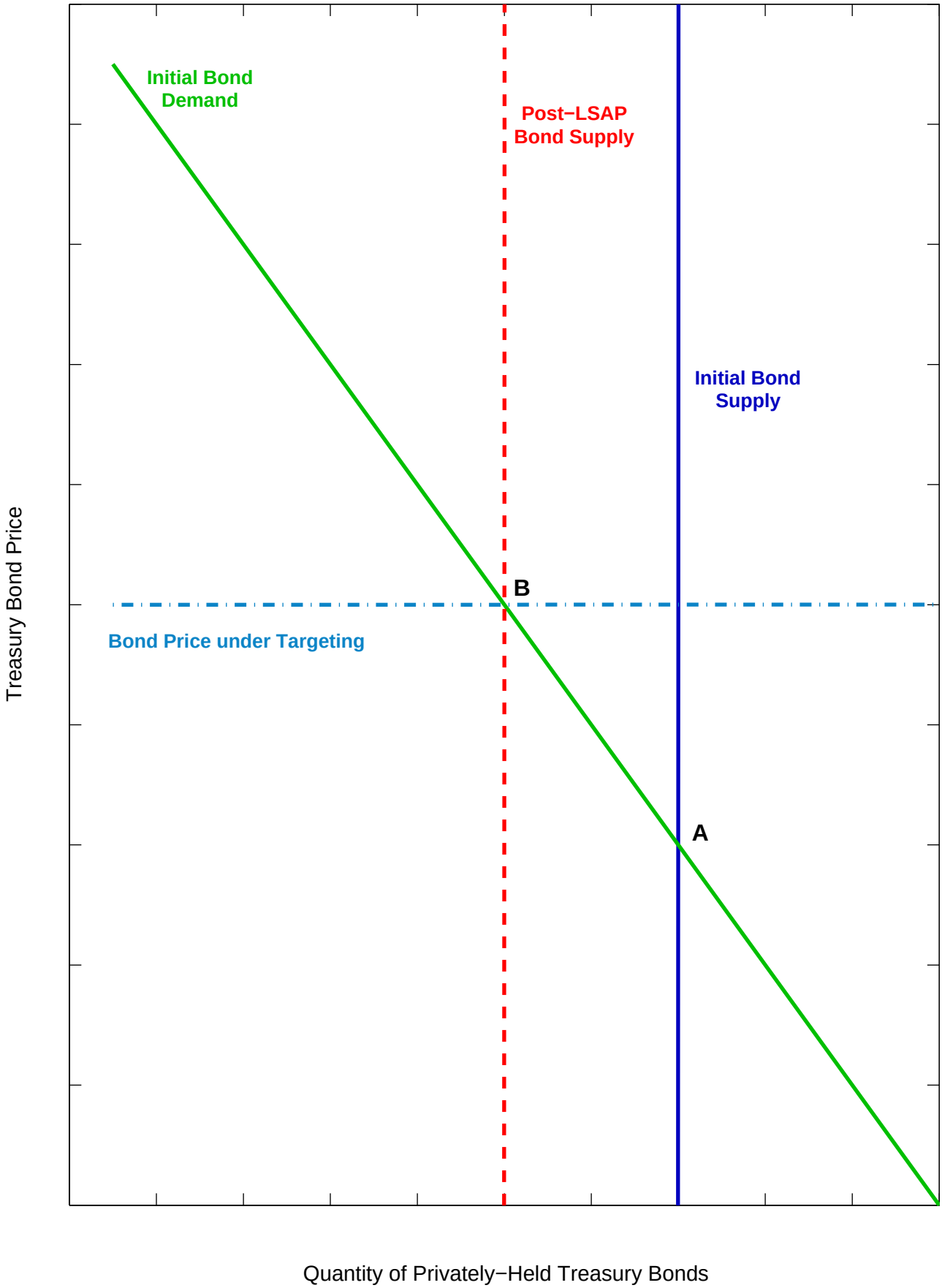


Figure 2. Interest Rate Targeting vs. LSAPs: Bond Demand Falls

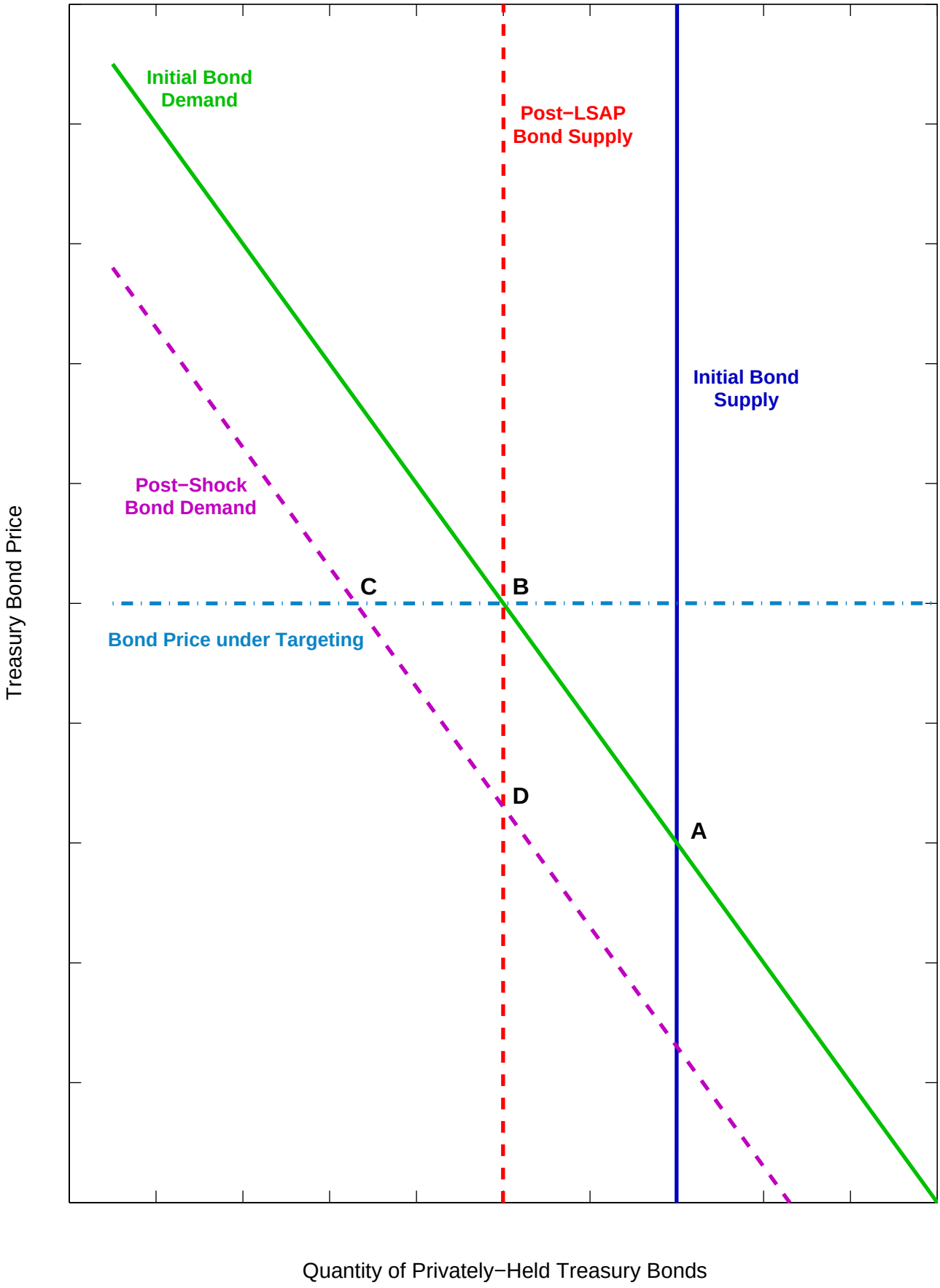


Figure 3. Interest Rate Targeting vs. LSAPs: Bond Demand Shifts Up