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Lessons on Yield Caps or Targets from International and U.S. Experience[1]

Experience with yield caps or targets (YCT) both historically in the United States and more recently in other countries can inform our understanding of the benefits and costs, as well as how to design and implement, such a program. This memo discusses the Federal Reserve's experience during and after World War II as well as the ongoing experience of the Bank of Japan (BOJ) and the Reserve Bank of Australia (RBA). The RBA's new 3-year target is an example of YCT working in tandem with forward guidance, while the other two episodes provide insights into targeting longer-term rates along with associated implementation challenges. The memo provides a thematic discussion of key lessons on policy objectives, financial effects, program design, and implications for the central bank's balance sheet and independence. It also contains an appendix examining each of these case studies of YCT.

Although central banks have had only limited experience with YCT, several key lessons are taking shape. So far, YCT has been used to reinforce forward guidance, control medium- to long-term yields with limited asset purchases, and influence key funding rates in the economy. YCT has operated alongside other tools, such as large-scale asset purchases (LSAPs) or targeted purchases aimed at reducing market dysfunction. In implementing YCT, central banks have allowed some flexibility through soft targets or ranges, with credible commitments to intervene at the margins. Nevertheless, YCT presents unique challenges. For instance, articulating the conditions for exit from YCT may be difficult, with potentially significant market pressures ahead of an anticipated exit. YCT also increases the link between monetary and fiscal policy; this can make both policies more effective in responding to an emergency situation, but a persistent YCT program may cause tensions between monetary policy and debt management.

A. Lessons on Objectives

The objectives of yield caps or targets vary across the episodes discussed in this memo, reflecting the varying circumstances that the three central banks faced when they initiated their programs. YCT has been used to reinforce other central bank communication and tools, but may present unique challenges.

YCT has been aimed at various objectives

Central banks have sought to use yield caps or targets to support several types of objectives, including to: (1) reinforce forward guidance near the effective lower bound (ELB); (2) maintain low rates throughout the economy and manage rates across the yield curve more

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firmly; (3) improve functioning of the government bond market; and (4) facilitate coordination with fiscal authorities in times of extraordinary issuance. Experience from the RBA and BOJ illustrates the first three objectives, while the 1940s Fed episode illustrates (2) and (4).

On March 19, 2020, the RBA cut its policy rate, the overnight cash rate, to its stated ELB of 0.25 percent and announced a target for the yield on 3-year Australian Government Bonds (AGBs) at the same 0.25 percent rate. The RBA said: "We have chosen the three-year horizon as it influences funding rates across much of the Australian economy and is an important rate in financial markets. It is also consistent with the Board's expectation that the cash rate will remain at its current level for some years, but not forever" (Lowe, 2020). With Australian mortgages based on floating rates and corporate issuance concentrated in the 3- to 5-year sector, controlling yields in these intermediate maturities is particularly effective in influencing economic activity. The RBA initially purchased sizable quantities across the yield curve, primarily to address market dysfunction that was occurring around the time of the announcement. As market functioning has improved, purchases have slowed. Some market participants noted that the yield curve target may also have the effect of containing the cost of government borrowing, although this was not a stated objective.

In contrast to the RBA, the BOJ adopted its YCT framework to strengthen the sustainability of its ongoing unconventional policy accommodation by mitigating side effects associated with LSAPs and negative interest rate policy (NIRP). The BOJ introduced the policy in September 2016, pledging to keep 10-year Japanese Government Bond (JGB) yields at "around 0 percent." A key goal of the new framework was to attenuate market functioning challenges stemming from the BOJ's large and growing footprint in the JGB market from years of LSAPs. Rather than seeking to further lower long-term interest rates, the program sought to help the JGB yield curve maintain a modestly positive slope following a post-NIRP curve-flattening trend that threatened the profitability of the Japanese financial sector.

In the early 1940s, the Federal Reserve and the Treasury agreed that interest rates on long-term government debt should be kept low and stable to support a surge in Treasury issuance that was expected to occur as military spending increased. While the primary goal of this policy was to hold down the cost to the Treasury of issuing long-term debt, the implementation strategy included establishing caps on interest rates across the entire yield curve. The caps were intended to maintain the existing upward-sloping structure of interest rates, rather than to move rates lower, and were established at levels slightly above prevailing rates. Interest rates were already low, amid an abundant supply of reserves in the banking system and an economy that was still recovering from the Great Depression. The Federal Reserve announced a ⅜ percent cap on the Treasury bill rate in May 1942, but it did not provide guidance on how long the cap would be in place. At the other end of the yield curve, the cap on the long-term rate (that is, for securities with a maturity of more than 25 years) was set at 2½ percent, while intermediate yield caps included ⅞ percent on one-year issues, 2 percent on 10-year issues, and 2¼ percent on 16-year

issues. These caps on long- and intermediate-term rates were not formally announced, but were made clear through informal communication by public officials.

YCT can support policy rate forward guidance with balance sheet commitment

The RBA's forward guidance on its cash rate is conditioned on economic outcomes. In its May Statement on Monetary Policy, the RBA says "it will not increase the cash rate target until progress is being made towards full employment and it is confident that inflation will be sustainably within the 2–3 per cent target band" (Reserve Bank of Australia, 2020d). The RBA statement follows with non-specific guidance on when those conditions are likely to be met: "Given the outlook for the Australian economy, this means that the cash rate is unlikely to be increased for an extended period of time." In the same Statement, the RBA indicates that its 3-year yield target is "consistent with the Board's expectation that the cash rate will remain at its current level for some years." Thus, the RBA sees its 3-year yield target as broadly reinforcing the time-based element of its forward guidance on the cash rate, suggesting that the RBA currently believes the conditions for raising the cash rate are unlikely to be met for more than three years.

The May Statement provides no indication of how long the 3-year target is likely to be in place, but RBA Governor Lowe's speech introducing the target in March said: "We expect to maintain the target for three-year yields until progress is being made towards our goals of full employment and the inflation target. Our expectation, though, is that the yield target will be removed before the cash rate is increased." This establishes a hierarchy by which the 3-year target could be removed or modified based on "progress" towards the inflation target, with the cash rate not rising until the RBA is confident that inflation will be sustainably within its target band.

Conditioning YCT exit on economic outcomes may introduce challenges

Both the RBA and BOJ have conditioned exit from their ongoing YCT programs on the attainment of economic outcomes, which has the advantage of allowing policy to respond to shifts in economic conditions. However, both central banks could face challenges either in changing program parameters—such as the target level or horizon of controlled yields—or in exiting. In particular, progress toward policy objectives could pressure yields higher, causing increases in market volatility and in central bank purchases needed to maintain the policy stance. In this sense, the full effect of YCT on the central bank's balance sheet will only be apparent after exit, as required purchases may increase significantly in the later stages of the policy.

The RBA's exit from YCT is conditioned on progress towards the Bank's employment and inflation goals. Currently, the RBA's baseline economic forecasts show inflation and employment beneath the RBA's goals at its forecast horizon in June 2022, but with both variables moving in a positive direction. Overall, the RBA's guidance leaves policymakers significant latitude in determining when to initiate exit from YCT.

The duration of the BOJ's YCT policy, also outcome-based, is linked to its inflation overshooting commitment, in which it pledges to expand the monetary base until inflation exceeds the 2 percent target and stays above it in a stable manner. Although achievement of this goal is viewed as a distant prospect, market participants have speculated that, as the inflation target is approached, the BOJ could widen the tolerance band around zero percent 10-year yield target – effectively raising it – before ultimately removing the target.

The BOJ has widened its tolerance band once, on July 31, 2018, and this experience illustrates the pressures that can occur when the market thinks the central bank will change its yield cap. On July 20, a news article suggested the BOJ was considering a wider band. The yield on the 10-year JGB subsequently increased from around zero to just over 10 basis points (the top of the band then in place) during July 23-29. The BOJ did fixed-rate operations three times (standing ready to buy unlimited amounts) first at 11 basis points with no bids, and then twice at 10 basis points with bids in moderate amounts before widening the band.

B. Lessons on the Financial Effects of YCT

In all three cases, central banks to date have been able to use YCT to control key medium- to long-term yields. The recent examples suggest that central banks may be able to do so without requiring large asset purchases, although these ongoing programs have yet to face potential challenges posed by exit. There is also evidence that YCT on government securities passes through to private interest rates.

A credible YCT can be effective at capping yields, and may not require large asset purchases

In all three examples of YCT, the central banks were able to keep yields below their caps or near their targets, and both the RBA and BOJ have been able to limit the scale and pace of asset purchases since adopting YCT. In theory, so long as commitments are viewed as credible, YCT should limit central bank operations relative to quantity-based LSAP programs. However, because of weak economic outlooks and subdued inflation pressures, it is difficult to conclude decisively that purchases under the RBA and BOJ YCT programs have been smaller than would have been required to achieve the same yields with LSAPs. Of note, the RBA's purchases within the 3-year horizon declined significantly since it adopted YCT, with no short-dated purchases since mid-April, although there is some expectation that upcoming lumpy fiscal issuance could require additional operations to stabilize yields. Similarly, the BOJ has been able to significantly taper its asset purchases while maintaining its yield target—from ¥80 trillion per year before it adopted YCT to around ¥20 trillion per year currently.

YCT generally passed through to private rates

Like forward guidance or LSAPs, YCT effects on the yield curve for government bonds have generally passed through to other interest rates and asset markets in the economy. For instance, following the RBA's introduction of its yield target, the 20 basis point decline in the 3-year AGB yield was accompanied by declines in yields on Australian investment grade

corporate bonds in the 3-5 year and 5-10 year maturity sectors of 10 to 20 basis points. This allowed the RBA to provide a modest amount of additional stimulus at the maturities relevant for Australian corporate borrowers.

In the 1940s and early 1950s, actions by the Fed to cap Treasury yields appear, for the most part, to have kept private rates low as well. Private money market rates generally stayed close to the bill rate during the period when that rate was capped, although private rates did increase moderately prior to the lifting of the Treasury bill rate cap. For longer-term rates, the spread between rates on longer-term AAA-rated corporate bonds and Treasury bonds was generally stable. This spread widened somewhat in 1947, around the time when the ceiling on the bill rate ended. However, as rates on Treasury securities moved below the cap in 1949, the spread between the private and Treasury long-term rates did not change appreciably, which suggests that the caps were not significantly distorting the relationship between the two rates.

C. Lessons on Design Features

Central banks have several choices in how they manage yields at the targeted maturity. For example, central banks can (1) choose to cap the yield at a specific level, (2) tightly control movement around a targeted yield, or (3) have a "soft" target that allows some deviation in yields. For (1) and (2), fixed-rate, full-allotment operations may be required, while for (3) the central bank has some flexibility in the amounts that it will purchase to drive yields toward the target. The Federal Reserve in the 1940s opted for caps on Treasury yields, while the BOJ and RBA have used soft targets.

A soft target can limit operations and encourage secondary market trading activity

Both the RBA and the BOJ have successfully implemented soft targets that permit some deviation from their stated yield objectives, although hard caps can be employed when the target is under pressure. The RBA's soft target gives it more control over the amount it purchases and so far has helped limit its operational footprint. The RBA noted that "it would not make sense" to "counter natural variation" around its target, though the RBA has not indicated how much variation it would allow (Lowe, 2020). The RBA conducts both its YCT and market functioning-related purchases in the same multi-price auction, with the combined size of all purchases announced daily.

The BOJ has also operated with a soft target primarily through competitive auctions, although it has occasionally employed fixed-rate operations in response to persistent upward pressure on yields. The BOJ initially allowed the 10-year yield to fluctuate within an informal band of plus or minus 10 basis points range around 0 percent. However, it expanded the range to plus or minus 20 basis points in July 2018 to allow for more JGB volatility and encourage trading in JGBs, with dealer-to client transaction volumes increasing modestly following the action. The widening of the range also permitted yields to provide a stronger market signal of underlying conditions.

On occasion, the BOJ has employed fixed-rate operations, either full allotment or with upper limits on purchase amounts, when yields have threatened to rise above the ceiling of its tolerance band. The BOJ has used fixed-rate operations seven times since it introduced a 10-year target in 2016, often resulting in no BOJ purchases.

Yield control policies, even when stated as targets, have tended to be asymmetrically controlled

In the international and historical experiences with YCT, central banks have responded more actively to limit upward pressure on yields than to counter downward pressure. While the BOJ's intention is for a symmetric target in order to preserve a positive yield curve slope, the BOJ in practice has been challenged in maintaining the floor. Since the BOJ adopted YCT, 10-year JGB yields have traded in a negative 28 to positive 16 basis points range. When yields have drifted below the bottom of the informal tolerance range, the BOJ has slowed purchases but has been unwilling to sell JGBs, as sales could be perceived as tightening policy.

The RBA has not explicitly communicated whether its target is symmetric, but it is believed to be more of a cap, as the RBA has a relatively small stock of government bonds and is thought to be disinclined to sell bonds if the 3-year yield drifts below its target.[2] Similarly, long-term rates in the United States during the 1940s were often below the cap established by the Fed, although the bill rate was pinned at the ceiling for nearly the entire period that the caps were in place. There is no record that the Fed and Treasury agreed to set a floor on any of the yields.

Purchases to maintain YCT can be simultaneous with purchases to meet other objectives

YCT-related purchases by RBA and BOJ coexist with other purchase programs that have different policy objectives. The RBA's YCT purchases have been accompanied by longer-dated purchases aimed at supporting market functioning. In the days before the program announcement, AGB volatility spiked amid a flight to cash, and liquidity deteriorated notably, especially for off-the-run bonds. In the days following the RBA's announcement, longer-term yields settled near pre-March levels, after considerable initial volatility amid uncertainty about whether the RBA would purchase at long end of the curve. Volatility in longer-term AGB yields declined further over the first few weeks of the program along with improving market liquidity, allowing the RBA to reduce its longer-term bond purchases.

The BOJ's YCT program operates in tandem with its pre-existing LSAP program, Quantitative and Qualitative Monetary Easing (QQE), which features purchases across the curve, including beyond the 10-year sector, as well as purchases of various private assets. Moreover, in response to sharp declines in liquidity conditions in March 2020, the BOJ temporarily increased the scale of its purchases. The BOJ clarified in its April monetary policy statement that its heightened purchases could continue "with a view to maintaining stability in the bond market

[2] However, RBA officials have noted their willingness to lend securities in the event of excessive repo specialness.

and stabilizing the entire yield curve at a low level," somewhat different goals than those associated with its YCT program (Bank of Japan, 2020b)

D. Lessons on Implications for the Central Bank Balance Sheet and Independence

Implementing YCT requires central banks to focus on managing interest rates and to allow the balance sheet to adjust as necessary to do so. By affecting the government's debt service costs directly, these policies have implications for the interactions between the monetary and fiscal authorities.

Managing the yield curve can imply loss of control in the central bank's balance sheet

In the U.S. experience in the 1940s, implementing yield caps meant that the size of the System's securities portfolio was determined by the extent to which the Federal Reserve needed to defend the caps as well as by Treasury issuance volumes. The Federal Reserve had to buy any government securities that private investors did not want to hold at the established rates (Garbade, 2020). As a consequence, the supply of reserves adjusted endogenously to changes in private investors' willingness to hold Treasury securities and to absorb new debt issuance.

Furthermore, the incentives created by the positive slope of the caps structure, rather than the choices of Federal Reserve officials, determined the maturity composition of the System's Treasury portfolio. Once private investors became convinced that the established rate pattern would persist for the duration of the war, if not longer, the upward-sloping cap structure became inconsistent with their expectations about rates and Treasury's policy of issuing across the curve. To reap the higher returns, investors moved out the curve, reallocating their portfolios away from bills and toward higher-yielding long-term bonds, especially as the price volatility of those bonds was held down by the rate caps. At the same time, the Treasury continued to issue in the short-end of the yield curve in order to achieve a lower average cost of debt servicing and refused several times to accept the Federal Reserve's request to raise the cap on the bill rate. As a result, the Federal Reserve had to absorb in its portfolio a large share of the Treasury bill market in order to defend the cap on short-term rates (the Fed held about 75 percent of outstanding bills in 1945).[3] When the cap on bill rates was removed in 1947, while the cap on long-term rates was left in place, the opposite occurred. As short-term rates rose in the absence of the cap, investors shifted their holdings toward the short end of the curve and the resulting pressure on long-term rates meant that the Fed had to buy bonds to defend the cap.[4]

Managing the yield curve can create challenges for central bank independence

Because central bank management of the yield curve affects government funding costs, the central bank may remain exposed to shifts in debt management strategies, the appearance of

[3] As recounted by Garbade (2020), FRBNY President Sproul recognized in the post-war period that a more nearly flat curve would have been more appropriate for the maintenance of an effective yield caps policy.

[4] By the end of 1947, the share of outstanding bills owned by SOMA had fallen to about 45 percent.

monetary financing, and pressure by the fiscal authority. The BOJ has consistently communicated that its LSAP and YCT purchases should not be confused with monetary financing, most recently in April, when Governor Kuroda emphasized that recently augmented purchases were aimed exclusively at maintaining market stability. However, he also noted that concerted action between the BOJ and the government would be necessary in the current environment, and the April Monetary Policy Statement explicitly tied "further active purchases" to the liquidity impact of increased government issuance (Bank of Japan, 2020b). Similarly, when the RBA announced YCT, it noted that the program would help contain borrowing costs across the economy, singling out financial institutions, households and businesses while avoiding mention of the government (Lowe, 2020). However, the RBA also announced that it would work closely with the Australian Treasury's debt management office "to ensure the efficacy of its actions" (Reserve Bank of Australia, 2020c).

With regard to the U.S. historical experience, the coordination between the Fed and the Treasury to manage the yield curve during World War II contributed to Treasury's successful efforts to finance the war effort. However, after the war ended, pressure from Treasury to support its current and prospective refinancing requirements at unchanged rates made it difficult for the Federal Reserve to regain its independence and implement monetary policy. Federal Reserve officials, constrained in their ability to deal with rising inflation, pressed for an end to the caps. In 1947, after considerable negotiations between the Treasury and the Fed, the cap on the bill rate was removed and the Fed was able to regain some space to set monetary policy even though the caps on intermediate and longer-term rates were preserved. Adjustments to intermediate rate caps occurred, but only after negotiations between the Fed and the Treasury. At times, concerns that they might not be able to raise rates later may have led Fed policymakers to avoid or delay requests to decrease the caps. It was not until 1951, with the Fed-Treasury Accord, that the Fed was relieved of the obligation to defend the cap on all Treasury rates; bond yields rose above 2½ percent shortly thereafter, but remained at or below 2¾ percent for at least the next year.

Appendix: Details of International and U.S. Historical Experience

Reserve Bank of Australia (RBA)

Conditions before YCT was implemented

Prior to the RBA's implementation of a yield target in March 2020, the Australian economy grew by 2.2 percent over 2019, and unemployment had last printed at 5.3 percent. On a 12-month basis, CPI inflation was 1.8 percent, just below the RBA's target of "2–3 percent, on average, over time." However, these data pre-dated the COVID-19 pandemic and the implementation of social distancing measures to contain the spread of the virus. In its March 3 monetary policy decision, the RBA stated that "the global outbreak of the coronavirus is expected to delay progress in Australia towards full employment and the inflation target" (Reserve Bank of Australia, 2020a). In its most recent Statement on Monetary Policy, the RBA used higher-frequency indicators of economic activity to assess the severity of the downturn and to discuss downside risks to the inflation, employment, and growth outlooks (Reserve Bank of Australia, 2020d).

Additionally, shortly before the announcement of a suite of easing measures, Australian Government Bond (AGB) yields spiked due to COVID-related market dysfunction driven by AGB liquidations and anticipation of increased issuance to fund government programs.

RBA first exhausts conventional policy space during COVID-19 pandemic

Prior to the COVID-19 pandemic, the RBA had not used any unconventional monetary policy tools, and Australia had avoided recession since 1991. During the Global Financial Crisis, the RBA cut its policy rate (the cash rate) from 7.25 percent to 3 percent.

RBA Deputy Governor Guy Debelle stated in a speech titled "The Virus and Australian Economy" delivered on March 11, 2020 that the COVID-19 pandemic would have a material effect on the Australian economy (Debelle, 2020). In the Q&A session following the speech, he answered a question on unconventional policy tools by stating that the RBA would focus on targeting the "price" of longer-term government bonds (that is, yields), rather than a specific quantity of asset purchases, once the cash rate target hit its stated effective lower bound of 0.25 percent.

To strengthen its response to the weakening economic conditions arising from the COVID-19 pandemic, on March 19, 2020 the RBA cut the cash rate 50 basis points to 0.25 percent and stated that it "will not increase the cash rate until progress is made towards full employment and it is confident inflation will be sustainably within the 2-3 percent target band" (Reserve Bank of Australia, 2020c).

Yield target on 3-year Australian government bonds to reinforce cash rate guidance and anchor an important benchmark given market dislocations

Alongside the policy rate cut, the RBA announced it would implement a yield target on 3-year AGB. The RBA indicated it would allow for some "natural variation" around the target, though it has not provided guidance on an acceptable range of variation. The stated purpose of the target was to anchor an important benchmark rate in Australia's predominantly floating-rate fixed-income market and to reinforce forward guidance that the cash rate would remain at its all-time low "for some time" (Reserve Bank of Australia, 2020b). Most corporations borrow in the 3- to 5-year maturity segment, and, according to Australian economists, roughly 85 percent of mortgages in Australia are floating-rate, driven by front-end rates.[5] Alongside the yield target announcement, the RBA introduced a term funding scheme to provide 3-year funding to banks at a fixed rate of 0.25 percent.

Separately and concurrently, the RBA announced a program to purchase AGBs across various maturities as well as semi-government bonds (issued by Australian states and territories) to support market functioning. The RBA did not publicly announce the range of maturities it would purchase, although in the operations implemented since the announcement, it has purchased AGBs through the 9-year tenor. Amid heightened uncertainty and global flight from risk, volatility in the Australian bond market spiked prior to the RBA's March 19 meeting. AGB yields increased across the curve as investors reportedly liquidated assets, including AGBs, amid a race to cash. Liquidity deteriorated notably, with AGB bid-ask spreads widening to roughly five times their 2019 average, according to AGB traders.

In addition to the RBA's policies addressing the effects of COVID-19, Australian fiscal authorities announced relief packages equivalent to roughly 12 percent of GDP to be funded in the AGB market. In its yield target announcement, the RBA stated that it is working with fiscal authorities "to ensure the efficacy of its actions." Relatedly, contacts have highlighted that low, stable AGB yields should help the government fund its COVID-related stimulus.

Following the announcement of the yield target and market functioning purchases, the 3-year and 5-year yields declined by roughly 20 basis points, while longer-dated yields were little changed, despite displaying considerable volatility initially (Figure 1). AGB traders attributed that volatility to misunderstanding over whether the RBA would purchase longer-dated bonds given that it had announced a shorter-dated yield target. The volatility in longer-dated tenors declined after the speech by RBA Governor Philip Lowe that followed the release of the March 19, 2020 decision, which reiterated that the RBA would purchase longer-dated bonds in its forthcoming operations to achieve its market functioning goals. The spread between the 2-year and 10-year AGB yield decreased from roughly 100 basis points just prior to the announcement to around 70 basis points the day following the announcement.

[5] Additionally, RBA contacts noted that traditionally only the central government borrowed in longer-dated maturities.

Prior to this first operation, the RBA did not own any AGBs; to date, it has purchased a total of AUS$51 billion in securities, including AUS$12 billion of AGBs with a maturity of three years or less (Figure 2).[6] The RBA has decreased the frequency and size of both its yield target-related and its market functioning-related purchases since its first operation on March 20, 2020. The RBA explained its decision to scale back purchases in subsequent monetary policy decisions, stating that "the functioning of the government bond markets has improved and the yield on 3-year [AGB] is at the target" (Reserve Bank of Australia, 2020e). In the same statement, the RBA stated that it is "prepared to scale-up these purchases again and will do whatever is necessary to ensure bond markets remain functional and to achieve the yield target for 3-year AGB."

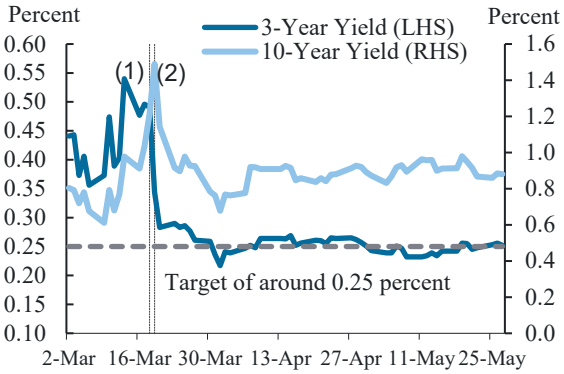
The RBA stated that it will remove the yield target before raising the cash rate, and noted that the yield target "would be maintained until progress was made towards the Bank's goals of full employment and the inflation target" (Reserve Bank of Australia, 2020b).

The structure of RBA operations

The RBA conducts both its yield target and market functioning-related purchases in the same auction, with the combined size of all purchases announced daily. The auction is conducted as a multi-price auction in which the RBA accepts offers at the most attractive prices up until the operation limit. The RBA does not formally distinguish between the two types of purchases, but contacts have generally categorized short-end purchases (maturities of three years or less) as supporting the yield target and purchases of maturities greater than three years as supporting market functioning-related issues. There is no limit on the amount of the RBA's total purchases, giving it the ability to size its operations to achieve both its target and market-functioning goals. The RBA announces its purchases daily and does not provide any guidance on weekly or monthly purchases.

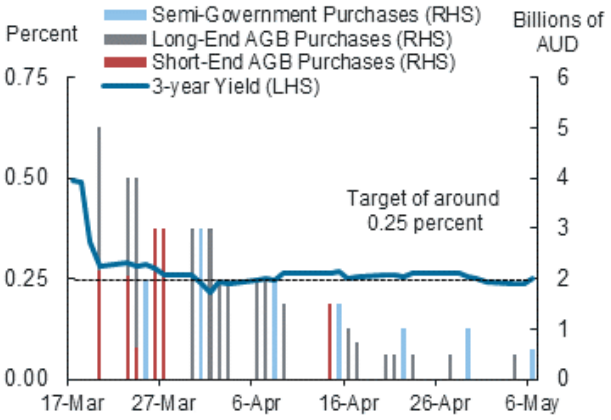
[6] According to data from the Australian Office of Financial Management (AOFM), the par value of AGBs outstanding was AUS$529.7 billion as of April 30, 2020. Net issuance has increased AUS$21.7 billion since the beginning of 2020 as AOFM increased issuance to fund COVID-related spending. The weighted-average maturity of AGBs outstanding was 7.5 years as of April 30.

Figure 1: AGB Yields



(1) RBA March 19 Decision & Governor Lowe Speech
(2) First RBA Operation
Source: Bloomberg

Figure 2: Australian 3-Year Yield and Total Purchases



Source: Bloomberg
Note: Short-end purchases have maturities of 3 years or less

Bank of Japan (BOJ)

Conditions before Yield Curve Control (YCC) was implemented

Heading into the fall of 2016, the quantitative and qualitative easing (QQE) program launched by the BOJ in April 2013 was generally seen by market participants as having materially improved economic activity, but as having little success in raising inflation expectations. The output gap had narrowed to 2 percentage points, annualized real GDP growth was averaging around half a percent, and the unemployment rate remained below 4 percent. However, inflation was stuck below target at 0.4 percent, and inflation expectations were similarly weak. While QQE had initially pushed inflation higher, since late 2014 the fall in crude oil prices, weakness in domestic demand following the April 2014 consumption tax hike, and weaknesses in emerging market economies all contributed to increase deflationary pressures once again. Market participants perceived a risk that deflation, which was last seen in late 2013, could return.

Additionally, the introduction of negative interest rate policy (NIRP) in January 2016 had some adverse effects on the functioning of financial intermediaries, as Japan's yield curve began to flatten more than expected. Concerns centered around the deterioration of banks' profitability and decreasing rates of return on long-term insurance and pension products, which could weaken market confidence. Yields for JGBs fell across the entire yield curve, with nominal long-term interest rates declining substantially and the 10-year JGB yield going into negative territory. The spread between 2- and 10-year JGB yields narrowed by nearly 60 basis points from mid-2015 to mid-2016 to a level of around 4 basis points—the second narrowest level seen over the last five years—and, by the end of July 2016, the 10-year JGB yield was trading at negative 0.25 percent (Figure 3). Against this backdrop of deteriorating inflation expectations and a collapse in the JGB curve, the BOJ launched the third phase of its QQE program, YCC, in September 2016.

Figure 3: JGB yields

Source: Bloomberg

BOJ introduces YCC following considerable asset purchases

The BOJ's previous framework of QQE with NIRP involved massive asset purchases that drove the BOJ's ownership of JGBs to the largest share of government bonds relative to amounts outstanding among major central banks. The BOJ's large footprint in the JGB market appeared to be affecting market functioning, as JGB liquidity metrics were deteriorating leading up to September 2016, as evidenced in part by lower JGB transaction volumes, declining market depth, and a sharp decline in the BOJ's survey measures of market liquidity (Figures 4 and 5).[7]

An additional effect of the previous framework was that it flattened the yield curve, leading to concerns among some market participants and BOJ officials about adverse effects on the profitability of financial institutions and the risk of a pullback in financial intermediation (Brichetti and others, 2018). YCC was seen as the BOJ's tool for maintaining the stimulus provided by low short- and medium-term rates without the negative financial effects induced by an excessively flat yield curve.

The move to YCC marked a transition from a quantity-based purchase program to a target price-based program, in which the BOJ pledged to buy long-term JGBs to keep 10-year bond yields at "around 0 percent." In its September 2016 policy statement, the BOJ stated that

[7] Market participants frequently refer to the BOJ's Diffusion Index for the degree of bond market functioning, which reflects survey respondents' overall assessment of changes in JGB market functioning. The index is produced as part of the BOJ's quarterly Bond Market Survey, available at https://www.boj.or.jp/en/paym/bond/index.htm. For the most recent update to the index in the March 2020 survey, see Bank of Japan (2020a, p. 3).

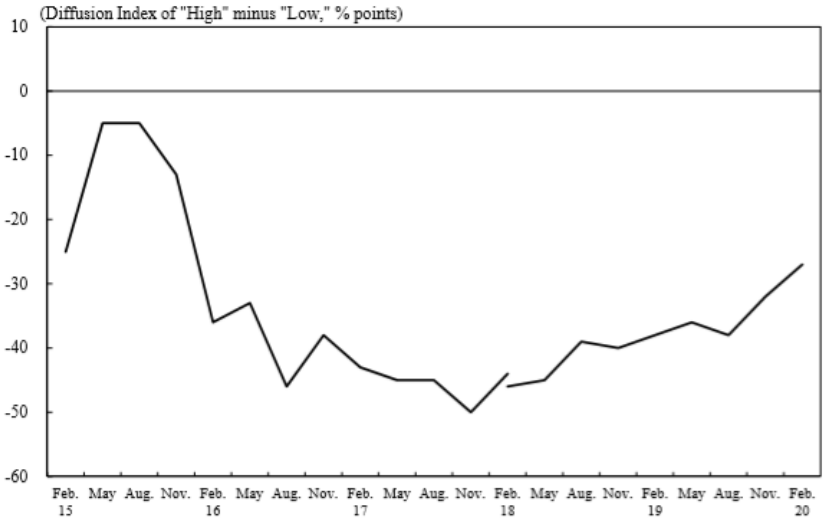
the purpose of YCC was to "seek for the decline in real interest rates by controlling short-term and long-term interest rates."[8] Market participants interpreted the policy in the context of the deterioration in JGB liquidity and flattening yield curve, noting that YCC was intended to steepen the JGB yield curve, limit the pace and quantity of BOJ purchases, and still maintain an accommodative stance. In the first couple of weeks after the introduction of YCC, interest rate volatility sharply declined, and, since then, 10-year JGBs have generally traded within a tight range and the slope of the yield curve has remained positive (Figure 3). The BOJ has been able to taper significantly its asset purchases while maintaining its yield target—from ¥80 trillion per year before it adopted YCC to around ¥20 trillion per year currently (Figure 6).

In July 2018, the BOJ made several adjustments to its YCC implementation framework to improve the sustainability of its policy regime given challenges to financial institution profitability and the BOJ's continued growing footprint in JGB markets. Most notably, the BOJ allowed for the range around the zero percent target to double.[9] Governor Kuroda mentioned the plus or minus 20 basis points range in the press conference following the BOJ meeting, in contrast to the previous target range of plus or minus 10 basis points used to be inferred and assumed by market participants. At that same meeting, the BOJ also reduced the amount of reserves remunerated at negative rates in order to alleviate some pressure on financial institutions' profitability.

[8] See the Comprehensive Assessment (Bank of Japan, 2016a) released together with the YCC policy statement (Bank of Japan, 2016b). The BOJ noted that "the impact of interest rates on economic activity and prices as well as financial conditions depends on the shape of the yield curve. In this regard, the following… points warrant attention. First, short- and medium-term interest rates have a larger impact on economic activity than longer-term rates… Third, an excessive decline and flattening of the yield curve may have a negative impact on economic activity by leading to a deterioration in people's sentiment, as it can cause uncertainty about the sustainability of financial functioning in a broader sense" (Bank of Japan, 2016a, p. 11).

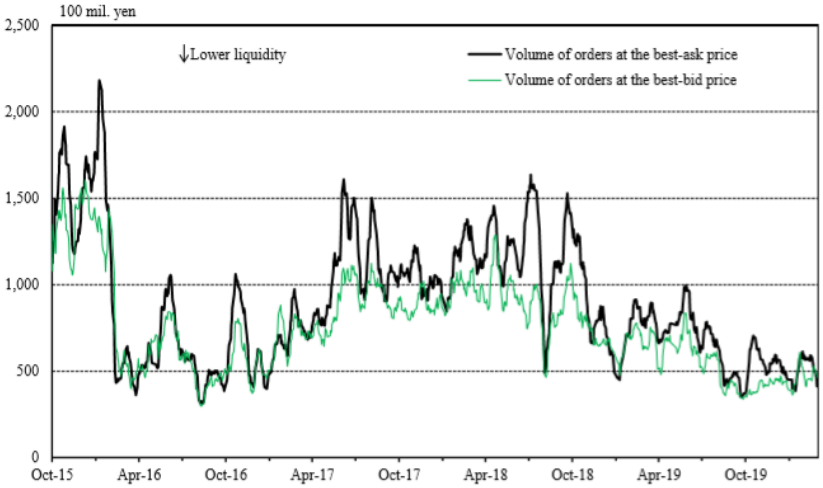
[9] In its post-meeting statement, the BOJ stated "….it is likely to take more time than expected to achieve the price stability target of 2 percent," and "…the Bank judged it appropriate to introduce forward guidance for policy rates and to enhance the sustainability of "QQE with Yield Curve Control" by conducting market operations as well as asset purchases in a more flexible manner" (Bank of Japan, 2018a, pp. 2-3). The minutes of the meeting also stated that "Some members said that, in order to continue further with powerful monetary easing, it was necessary to pay close attention to the side effects stemming from this and to examine carefully whether there was room to review the policy framework with a view to minimizing such side effects as much as possible." Later, most members agreed that, "….long-term yields might move upward and downward at about double the range seen to date of around plus or minus 0.1 percent, and that this should be made clear at the press conference to be given by the chairman after this meeting" (Bank of Japan, 2018b, pp. 17, 21).

Figure 4: BOJ Market Functioning Survey Diffusion Index



Source: Bank of Japan

Figure 5: JGB Market Depth: Volume of Orders at the Best Ask (Bid) Price in Interdealer Transactions



Note: Depth is calculated by the BOJ by summing up the median of volume of orders at the best ask (bid) price with a 1-second frequency per issue. 10-day backward moving average.
Source: Bank of Japan

The structure of BOJ operations

To implement its YCC framework, the BOJ predominantly combines (1) regularly scheduled, fixed amount JGB purchase operations across different sectors of the JGB yield curve ("Rinban" operations, competitive auctions) with (2) occasional ad-hoc fixed-rate full allotment JGB purchase operations to prevent JGB yields from rising above the limits of the BOJ's YCC range. The BOJ regularly conducts the competitive auctions, and, if yields stray towards the limits of its YCC range, it may opt to employ fixed-rate operations, in which it could theoretically buy an unlimited amount of JGBs. In principle, the option to employ fixed-rate

tenders offers the flexibility to defend a yield target more effectively, as they would no longer be limited by a particular quantity, and, in that case, the BOJ's intentions would be clearer to market participants. However, the fixed-rate operation has been rarely used—seven times since the introduction of YCC—only when the 10-year JGB yield moved towards the upper bound of the perceived yield target range.[10]

While reduced volatility at the targeted sector is a desired outcome of YCC programs, market participants note that fixed-rate operations that limit volatility by an excessive degree can discourage trading of JGBs. Therefore, the BOJ has had to balance its goal to keep the 10-year yield close to its target through fixed-rate tenders with the benefits of increased market engagement in JGB markets. For example, in July 2018, the BOJ did not intervene with a fixed-rate operation when the 10-year JGB yield approached the limit of what was then the 10 basis points band, and instead signaled to market participants that it would double the range in which the 10-year JGB yield would be allowed to fluctuate around its target yield (effectively plus or minus 20 basis points). The BOJ has noted that controlling long-term yields in a flexible manner is likely to contribute to maintaining and improving market functioning.[11]

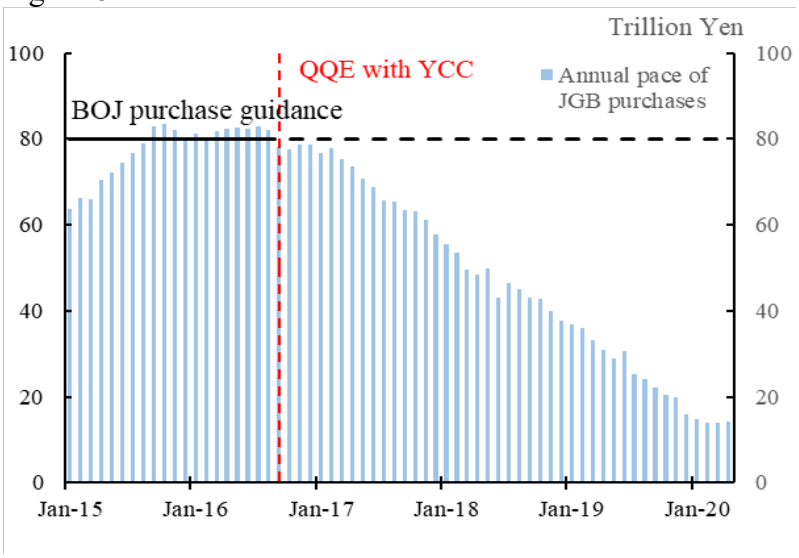
Potential asymmetry in BOJ's fixed-rate operation: less effective with falling yields

While the BOJ's program has been largely successful in maintaining the 10-year yield around zero percent, market participants have noted that the YCC program could be less effective when yields are declining as the BOJ could need to sell JGBs while also maintaining an accommodative monetary policy stance. The intention of the BOJ to have a symmetric target to prevent yields from declining far below target may be motivated by its desire to preserve a positive slope to the yield curve. When yields are below-target, the BOJ can limit the pace of purchases, but it has been reluctant to sell JGBs to defend the yield floor because it does not want to convey any signal that it could be exiting accommodation or tightening its policy stance. Indeed, the BOJ has not conducted any fixed-rate selling of JGBs thus far, even when 10-year yield declined to around negative 30 basis points in August 2019. Some contacts have suggested that the BOJ could potentially switch to targeting 5-year yields, with a lower yield target level and a wider range of variation, in the event of persistent downward pressure on the 10-year yield.

[10] The fixed-rate method has been used seven times since YCC was introduced in September 2016: November 17, 2016, February 3, 2017, July 7, 2017, February 2, 2018, July 23, 2018, July 27, 2018, and July 30, 2018. JGBs purchased under fixed-rate operations account for around 5.3 percent of total JGBs held by the BOJ as of April 2020.

[11] Given that the 10-year yield has not risen above 16 basis points since the start of YCC, the BOJ's upper band of 20 basis points has not been challenged. It is therefore not clear how the BOJ would respond if yields moved persistently higher.

Figure 6: BOJ JGB Purchases



Source: Bank of Japan

Communications Around YCC

	RBA			BOJ		
	Date	Communication Type	Communication	Date	Communication Type	Communication
Announcement of Yield Target	03/19/20	Monetary Policy Decision Statement Speech	"[The] Reserve Bank Board agreed to the following comprehensive package to support the Australian economy through this challenging period: A target for the yield on 3-year Australian Government bonds of around 0.25 per cent. This will be achieved through purchases of Government bonds in the secondary market. Purchases of Government bonds and semi-government securities across the yield curve will be conducted to help achieve this target as well as to address market dislocations. The Bank will work closely with the Australian Office of Financial Management (AOFM) and state government borrowing authorities to ensure the efficacy of its actions." "I would also like to emphasise that we are not seeking to have the three-year yield identically at 25 basis points each and every day. There will be some natural variation, and it does not make sense to counter that.It may also take some time for yields to fall from their current level to 25 basis points."	09/21/16	Monetary Policy Decision Statement Speech	[With] a view to achieving the price stability target of 2 percent at the earliest possible time, the Bank decided to introduce "QQE with Yield Curve Control" by strengthening the two previous policy frameworks mentioned above. The new policy framework consists of two major components: the first is "yield curve control in which the Bank will control short-term and long-term interest rates; and the second is an "inflation-overshooting commitment" in which the Bank commits itself to expanding the monetary base until the year-on-year rate of increase in the observed consumer price index exceeds the price stability target of 2 percent and stays above the target in a stable manner. The short-term policy interest rate: The Bank will apply a negative interest rate of minus 0.1 percent to the Policy-Rate Balances in current accounts held by financial institutions at the Bank. The long-term interest rate: The Bank will purchase Japanese government bonds (JGBs) so that 10-year JGB yields will remain more or less at the current level (around zero percent). With regard to the amount of JGBs to be purchased, the Bank will conduct purchases more or less in line with the current pace - an annual pace of increase in the amount outstanding of its JGB holdings at about 80 trillion yen - aiming to achieve the target level of a long-term interest rate specified by the guideline. JGB with a wide range of maturities will continue to be eligible for purchase, while the guidance for average remaining maturity of the Bank's JGB purchases will be abolished."
Objectives	03/19/20	Speech	"We have chosen the three-year horizon as it influences funding rates across much of the Australian economy and is an important rate in financial markets. It is also consistent with the Board's expectation that the cash rate will remain at its current level for some years, but not forever."	09/21/16	Monetary Policy Decision Statement	"As shown in the comprehensive assessment, QQE has brought about improvements in economic activity and prices mainly through the decline in real interest rates, and Japan's economy is no longer in deflation, which is commonly defined as a sustained decline in prices. With this in mind, "yield curve control," in which the Bank will seek for the decline in real interest rates by controlling short-term and long-term interest rates, would be placed at teh core of the new policy framework."
Adjustments to YCC	-	-	-	07/31/18	Monetary Policy Decision Statement	"The Bank will purchase JGBs so that 10-year JGB yields will remain at around zero percent. While doing so, the yields may move upward and downward to some extent mainly depending on developments in economic activity and prices. With regard to the amout of JGBs to be purchased, the Bank will conduct purchases in a flexible manner so that their amount outstanding will increase at an annual pace of about 80 trillion yen."
Exit Conditions	03/19/20 04/07/20 05/05/20	Monetary Policy Decision Statement Speech Meeting Minutes	"We expect to maintain the target for three-year yields until progress is being made towards our goals of full employment and the inflation target. Our expectation, though, is that the yield target will be removed before the cash rate is increased."	04/27/20	Monetary Policy Decision Statement	"The Bank will continue with "QQE with Yield Curve Control", aiming to achieve the price stability target of 2 percent, as long as it is necessary for maintaining that target in a stable manner. It will continue expanding the monetary base until the year-on-year rate of increase in the observed consumer price index (CPI, all items less fresh food) exceeds 2 percent and stays above the target in a stable manner."
Changes in Purchases	04/07/20	Monetary Policy Decision Statement Speech Meeting Minutes	"In Australia, the yield on 3-year Australian Government bonds is now around the target level set by the Board and the functioning of the government bond markets has improved. The Bank will do what is necessary to achieve the 3-year yield target, with the target expected to remain in place until progress is being made towards the goals for full employment and inflation. functioning of these important markets. If conditions continue to improve, though, it is likely that smaller and less frequent purchases of government bonds will be required."	04/27/20	Monetary Policy Decision Statement	"The Bank will purchase a necessary amount of JGBs without setting an upper limit so that 10-year JGB yields will remain at around zero percent. While doing so, the yields may move upward and downward to some extent mainly depending on developments in economic activity and prices."

RBA vs. BOJ Yield Curve Control Comparison

	RBA	BOJ
Targets	Overnight rate: maintain the cash rate at 0.25 percent until inflation suitably within target range	Three tiers short-end rates: 1. Basic balance +0.1 percent (outstanding balances avg over 2015 less excess reserves). 2. Macro add-on balance -0.0 percent (reserves accumulated through BOJ lending programs and a multiplier of the basic balance). 3. Policy Balance Rate at -0.1 percent (all excess reserves held above the basic balance and Macro add-on). All rates are applied on current accounts held by financial institutions at the BOJ.
	3-year yield: A yield of "around 0.25 percent" on the 3-year AGB	10-year yield: A yield of "around 0" percent on the 10-year JGB
Variation around Target	"Natural variation" around the target	+/- 20 basis points
Tenors Purchased	Across curve for market functioning purposes; 3-year sector focus for yield target	Across curve for monetary policy considerations (including beyond 10-years); 10-year sector focus for yield target
Total Amount	No cap on total purchases across operations; though face value of each operation announced the morning of each purchase	No cap on total purchases; the BoJ will purchase a necessary amount of JGBs without setting an upper limit so that 10-year JGB yields will remain at around zero percent
Schedule of Purchase	No predetermined schedule other than announcement on day of operation	Monthly bond-purchase schedule (Rinban) released at the end of each month
Announcement of Operation Sizes	On the morning of the operation, an announcement indicates the total face value of the purchases and the specific securities the RBA is willing to purchase.	On the morning of the purchases, the BOJ announces the total face amount and specific securities the BOJ is willing to purchase. For competitive auctions, the BOJ provides a lower limit of desired yield spreads, while for fixed rate auctions, the BOJ provides yield spreads to be added to the benchmark yields.
Multi-Price Auction	Yes: RBA will purchase submitted offers at the most attractive prices up until the operation limit	Yes: accepts bids by starting with the highest desired yield spread without distinguishing between issues and continuing down until the total amount of bids accepted reaches the amount offered
Fixed Rate Method	None announced	Yes, more rarely used: BOJ accepts all bids at a fixed rate set by the BOJ. The BOJ may set an upper limit on purchases.

U.S. yield curve management 1942-1951

Interest rate caps were intended to ease U.S. government financing of WWII

Between mid-1941 and mid-1942, the Federal Reserve and the Treasury agreed that long-term interest rates should be kept low to facilitate the financing of the large amount of government debt expected to be issued to fund military spending. To implement this policy, the Federal Reserve established caps on interest rates across the entire yield curve. The financing needs of the government proved to be substantial. Between January 1942 and December 1945, outstanding government debt rose from $60 billion to $280 billion, after which it held fairly steady. By comparison, estimated nominal U.S. GDP in 1945 was about $220 billion.

Conditions before rate caps were implemented

When rate caps were first considered, the war in Europe had already broken out. The United States was supporting the United Kingdom through the Lend-Lease program that financed U.K. purchases of war material, which was already increasing U.S. government financing needs. The attack on Pearl Harbor and U.S. mobilization increased the urgency of the need to support debt issuance.

Economic conditions at that time were fairly favorable. Estimates of the unemployment rate suggest that it had come down considerably from the very high levels of the Great Depression and was near the levels observed in 1929. Consumer prices were moving up at a moderate pace, although they had not yet fully reversed the decreases of the early 1930s.

Interest rates on government debt were still fairly low. The rate on Treasury bills in December 1941 was only 30 basis points, above the low levels seen during the Depression, but well below the money market rates that had prevailed during the 1920s. Rates on 3-to-5 year tax-exempt Treasury notes at the same time averaged 64 basis points, only slightly higher than the low levels in the 1930s. Rates on Treasury bonds in December 1941 were just under 2 percent; even lower than they had been in the 1930s.

The structure of the interest rate caps

The structure of the interest rates caps fit with the prevailing upward-sloping yield curve. At the short-end, 13-week bill rates were capped at ⅜ percent, while at the long-end of the curve, rates on bonds with maturities of 25 years or more were capped at 2½ percent. There were also caps on the yields of securities with intermediate maturities; these caps included ⅞ percent on one-year issues, 2 percent on 10-year issues, and 2¼ percent on 16-year issues.

Early in discussions, there was agreement among Federal Reserve and Treasury officials about the cap on the long-term bond rate. The cap on the bill rate reflected a compromise following the Federal Reserve rejection of Treasury's initial demand that the

Fed commit to an abundant supply of excess reserves to bolster public demand for longer-term debt. Federal Reserve officials objected, but agreed to a ⅜ percent cap on bill yields. When that cap was established, Federal Reserve officials did not expect that it would remain unchanged. Caps at maturities longer than 13 weeks and shorter than 25 years were set at levels that led to a smooth yield curve. Once set, the caps remained unchanged for the duration of the war.

The structure of caps was based on the existing rate structure in the second half of 1941 and the first half of 1942; there is no evidence of any Federal Reserve undertaking to model and set market-clearing rates appropriate for a wartime economy (Garbade, 2020).

The cap on bill rates was announced publicly in May 1942. The caps on longer-term rates were never formally announced, perhaps to avoid embarrassment in case the policy proved unsuccessful (Chaurushiya and Kuttner, 2003).

Enforcing the rate caps from 1942 to 1947

The System Open Market Account bought bonds in 1942 to enforce the 2½ percent cap, but thereafter was a net seller, and ended the war owning fewer bonds than it had owned at the beginning.[12] By 1945, with long-term Treasury bond yields notably below their corresponding cap, the Fed had to importune Treasury to include long-term bonds in the Seventh War Loan drive to keep bond yields from falling further (Garbade, 2020).

To enforce the ⅜ percent cap on the short-term Treasury bill rate, the Federal Reserve had to act much more aggressively. As the policy of capping the yield curve at longer maturities became apparent, it also became clear that a steep, upward-sloping yield curve was inconsistent with a fixed structure of interest rates. An investor could move out the curve to pick up coupon income without taking on more risk and then ride the position down the curve, adding to total return. This strategy of "playing the pattern of rates" led many investors to prefer bonds to bills (Garbade, 2020).

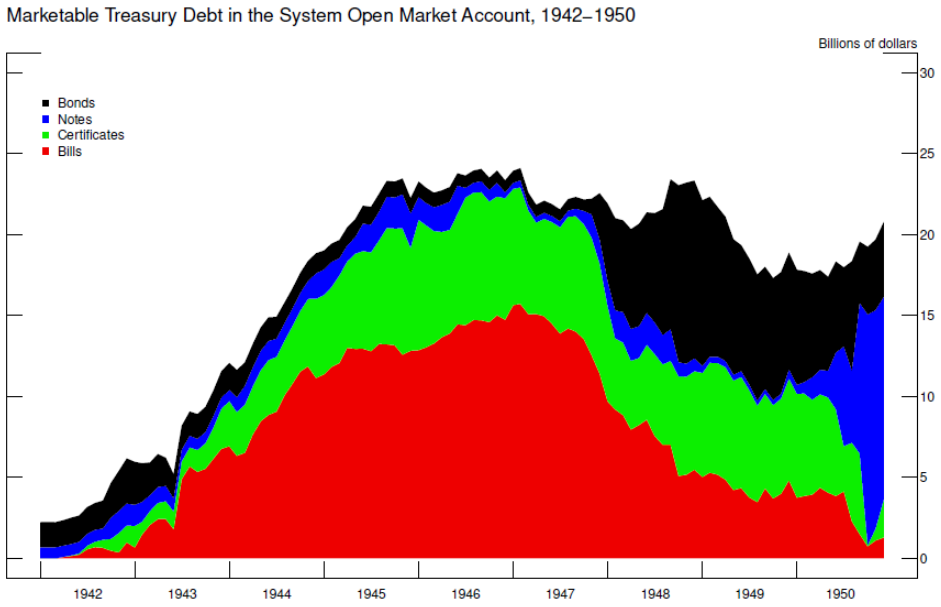
Investor preferences for bonds over bills, coupled with Treasury's expanding bill issuance, forced the Federal Reserve to purchase large quantities of Treasury bills to maintain the bill cap. By late 1945, SOMA held 75 percent of outstanding bills

[12] The motivations here are not certain. The Federal Reserve may have sold bonds because policymakers preferred rates to be closer to the 2½ percent ceiling. Alternatively, as policymakers were also concerned about the level of excess reserves, they may have decided to sell bonds to limit the effect of their sizeable purchases of bills on the level of reserves. Federal Reserve officials also encouraged the Treasury to issue more longer-maturity debt. Again, it is unclear the extent to which they preferred an increase in longer-term rates versus having Treasury adopt a policy that would have reduced the amount of bills that the Federal Reserve was forced to purchase.

(Garbade, 2020). Overall, the size of SOMA increased from $2.25 billion at the end of 1941 to $24.26 billion at the end of 1945 (Figure 7).

This experience points out that when caps across the curve are inconsistent with market expectations, investors will move to maturity segments that they believe are particularly advantageous while the central bank will need to absorb securities in other segments. Federal Reserve officials later concluded that a flatter curve might have required less intervention (Garbade, 2020). Another factor that can also affect intervention needs is the size and composition of debt issuance. For instance, in early 1946, longer-term rates were notably below the cap. If the Treasury had issued fewer bills and more long-term bonds at that point, it is likely that the Fed would not have needed to purchase as many short-term securities as it did.

Figure 7: SOMA Treasury Debt Holdings, 1942-1950



Source: Board of Governors of the Federal Reserve System (1976).

End of the cap on Treasury bill yields

While the Federal Reserve was able to effectively cap the Treasury bill rate, it was less able to control other short-term rates. Inflation picked-up in late 1946 as wage and price controls were lifted. Four- to six-month commercial paper rates rose notably and became decoupled from Treasury rates, suggesting that investors placed some odds on resurgent inflation leading the Federal Reserve to abandon the bill-rate cap (Carlson, Eggertson, and Mertens, 2008). At the same time, there was widespread reluctance to abandon the entire system of interest rate caps. Banks had purchased significant amounts of government securities during the war, which left them vulnerable to increasing interest rates and falling securities prices (Chaurushiya and Kuttner, 2003). Moreover, as there

was still a considerable amount of outstanding Treasury debt, the Treasury was concerned about increasing debt service costs if interest rates rose.

As a result of inflationary pressures, the Federal Reserve removed the cap on Treasury bill rates in July 1947. Bill rates began to climb and reached 95 basis points by the end of the year. Rising bill rates and a flattening yield curve triggered a reversal of investor preferences away from bonds and toward bills. Furthermore, once the Federal Reserve ended the ceiling on Treasury bill rates, investors may have become less confident about the durability of the cap on longer-term rates. In the face of steady selling, bond yields rose from 2.22 percent in June 1947 to 2.45 percent by January 1948, at which time the Federal Reserve signaled its commitment to the 2½ percent long-term rate, by purchasing bonds to enforce the cap. These purchases amounted to no more than a modest share of the market and that the Federal Reserve was able to defend the cap successfully without buying up the entire market for long-term government debt (Garbade, 2020). During the subsequent year and a half, the Federal Reserve continued to buy bonds while selling bills or allowing them to run off, thus shifting the composition of the SOMA portfolio from bills to bonds (Figure 7).

While the Federal Reserve was defending the cap on long-term rates, the spread between yields on long-term corporate and Treasury securities widened a bit. However, in 1949, when rates on Treasury securities moved lower, the spread did not narrow appreciably, which suggests that the caps were not significantly distorting the relationship between the two rates. This suggests that the Federal Reserve was able defend successfully the cap on long-term rates through purchases of securities, without causing long-term rates faced by private parties to decouple from the term structure implied by Treasury securities.

The caps on intermediate rates also remained in place. These were changed from time to time as a result of negotiations between the Federal Reserve and the Treasury, with the Treasury typically preferring lower rates. Chaurushiya and Kuttner (2003) report that, at times, the Federal Reserve may have been reluctant to lower these rates out of concern that they would have been unable to raise them later.

Regaining independence with 1951 Federal Reserve-Treasury Accord

In late November 1950, with the United States facing the prospect of a war in Korea, the Federal Reserve sought to free itself from its commitment to keep long-term Treasury yields below 2½ percent. At the same time, Secretary of the Treasury John Snyder and President Truman sought a reaffirmation of the Fed's commitment to the 2½ percent ceiling (Garbade, 2020). The impasse continued until mid-February 1951, when Secretary Snyder was hospitalized, leaving Assistant Secretary William McChesney Martin to negotiate what has become known as the "Treasury-Federal Reserve Accord." This agreement ended the obligation of the Federal Reserve to cap Treasury bond yields and allowed it to pursue an independent monetary policy. With the

end of the rate caps, yields on long-term Treasuries soon rose above the previous 2½ percent cap.

The end to the caps meant that the Treasury and Federal Reserve had to think about the losses inflicted on bondholders from rising long-term interest rates. These losses could have affected the solvency of banks and insurance companies, which were major holders of long-term Treasury securities. The Treasury's solution was to allow bondholders (under certain conditions) to convert some of their 2½ percent war bonds into nonmarketable 2¾ percent convertible bonds. Thus, the Treasury absorbed much of the losses associated with the end of the long-term ceiling rate (Chaurushiya and Kuttner, 2003). This conversion also reduced selling pressure on bond yields following the Accord.

After the Accord, there remained concerns about the ability of the Treasury to refinance the sizeable amount of outstanding debt as it matured. To support Treasury's financing operations, the Federal Reserve refrained from making substantial shifts in policy around the time of an offering. This supportive approach, generally referred to as "even keeling," lasted until the early 1970s, when the Treasury started issuing coupon-bearing debt through an auction-based system, with which there were fewer chances that a refinancing operation might not succeed.

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