Balance Sheet Policy and the Mortgage Market

Kristin Forbes, *Professor, Massachusetts Institute of Technology*

Kristin Forbes is the Jerome and Dorothy Lemelson Professor of Management and Global Economics at MIT's Sloan School of Management. She has regularly rotated between academia and senior policy positions. From 2014-2017 she was an External Member of the Monetary Policy Committee for the Bank of England. From 2003 to 2005 Forbes served as a Member of the White House's Council of Economic Advisers and from 2001-2002 she was a Deputy Assistant Secretary in the U.S. Treasury Department.

In 2019, Forbes was named an Honorary Commander of the Order of the British Empire (CBE) by Her Majesty Queen Elizabeth II. She is currently the Convener of the Bellagio Group, a research associate at the NBER and CEPR, and a member of the Aspen Economic Strategy Group and Council on Foreign Relations. She also serves in a number of advisory positions. Before joining MIT, Forbes worked at the World Bank and Morgan Stanley. She received her PhD in Economics from MIT and graduated *summa cum laude* with highest honors from Williams College

1. Introduction

The paper by Drechsler, Savoy, Schnabel and Supera (referred to as DSSS below) is a fantastic reference for anyone seeking to understand developments in the US mortgage market and how it is affected by monetary policy. DSSS explains that the transmission of monetary policy to the mortgage market is not simply the Econ 101 story of monetary policy affecting Treasury yields and therefore general borrowing costs (including mortgage rates). Instead, DSSS

focuses on two additional transmission channels through which monetary policy can also affect the spread between mortgage rates and Treasury yields, thereby amplifying the standard transmission of monetary policy through general borrowing costs. These amplifying transmission channels work through the Federal Reserve's balance sheet policies and the deposit channel of banks and can explain why monetary policy has had large and significant effects on mortgage credit and the housing market.

The transmission channels that are the focus of DSSS—and particularly the impact of the Federal Reserve's balance sheet adjustments on the housing market—have previously received minimal attention. Although there is an extensive literature on the effects of quantitative easing (QE) and quantitative tightening (QT), most studies focus on the impact on government bond yields and term premia (Du et al., 2024). Although some papers also assess the impact on MBS yields, only Krishnamurthy and Vissing-Jorgensen (2013) has focused on how balance sheet policies may affect mortgage spreads differently than other financial variables with a similar risk profile. Other literature examines how QE and QT affect bank reserves, repo markets, commercial banks and interbank loan markets, and although a few papers analyze the impact on mortgage refinancing (see summary in DSSS), housing finance is usually treated as a residual affected by changes in relative prices rather than introducing new channels for the transmission of monetary policy (i.e., Kumhof and Salgado-Moreno, 2024).

Theoretical models of the impact of QE and QT focus on central bank purchases of a generic "bond", with no differentiation between Treasuries and housing-related debt. Empirical work also tends to focus on the impact of government bond purchases—a logical focus as these constitute the vast majority of central bank purchases under QE programs and the US is unique in its inclusion of MBS as central to its QE and QT programs. The few papers that analyze the impact of programs targeting asset classes other than government bonds generally find a larger effect on the yields of the assets that are eligible

for central bank purchases, with meaningful but smaller spillovers on non-eligible assets.[1]

Is this literature missing important mechanisms through which monetary policy is transmitted to the mortgage market? My comments will focus on one of the new transmission mechanisms highlighted in the paper—through Federal Reserve balance sheet policies—as this is the title of this session of the symposium. My comments are divided into four parts. First, I briefly summarize the key channels and results in DSSS. Second, I summarize existing literature and report new empirical results testing if US QE and QT events affected mortgage rates and spreads. I find some support for this channel highlighted in DSSS—but of more modest magnitude than described in the paper. Third, I attempt to draw lessons from advanced economies other than the United States—albeit with limited success. Finally, I consider the implications for US asset purchase programs and conclude that the default should be to only involve US Treasuries. The upcoming framework review could be an opportune time to develop more detailed principles and guidelines on the specific and more limited circumstances when MBS should be included in any future QE programs.

2. Key Insights in DSSS

There is a lot of interesting material and analysis in this paper.

The paper begins with an excellent and informative description of what has happened in the US mortgage market since the pandemic. This includes a striking fall and then rise in the cost of mortgage credit, swings that correspond to a rise and then fall in mortgage originations and MBS issuance. Next, the paper develops a simple framework to

[1] For example, D'Amico and Kaminska (2019) finds that the UK corporate bond purchase program reduced spreads for all types of bonds, but had a greater impact on bonds eligible for the program (and stimulated bond issuance more broadly). Krishnamurthy and Vissing-Jorgensen (2013) finds a greater impact on MBS and Treasury yields when each type of security is included in the QE program, with minimal spillovers to other asset classes.

understand these patterns, based on changes in the supply of mortgage credit by the Federal Reserve, banks, and other financial institutions. Then the paper reports a series of regressions testing these channels, including estimates of how the Federal Reserve's MBS purchases affect the mortgage spread and what determines bank and investor demand for MBS. The paper ends by using these results in a counterfactual analysis to show the large and meaningful impact of Fed and bank MBS purchases on mortgage originations.

Two graphs from DSSS—their Figures 6 and 14—provide a useful framework to summarize this wealth of results. Figure 6 breaks down the sources of mortgage financing into four categories (banks' portfolio holdings, banks' MBS holdings, the Federal Reserve's MBS holdings, and holdings by all other investors) and then focuses on how each of these groups responds to and transmits changes in monetary policy. Some of these investor groups respond in ways that are not immediately intuitive. More specifically, the Federal Reserve and banks adjust their MBS holdings due to factors other than relative prices. This is a striking result. Investor groups holding over 50 percent of total mortgage capital at the start of 2023 are price insensitive—in the sense that they buy when prices are low and sell when prices are high. Nonetheless, DSSS explains why the transmission of monetary policy through the mortgage market still works.

Beginning with the investor group that only started buying MBS in response to the 2008 Global Financial Crisis, the Federal Reserve increased its MBS holdings from $1.4 trillion to $2.7 trillion over 2020-2022q1 as part of its pandemic QE program aimed at stabilizing financial markets and supporting the broader economy. Starting in April 2022, the Federal Reserve began reducing its MBS portfolio as part of its QT program reducing the size of its balance sheet by allowing its holdings to run-off when they expire (subject to caps), such that it had reduced its MBS holdings by $300bn in 2024q1. Most important, these changes in the Federal Reserve's MBS portfolio were driven by its mandate to support price stability, maximum

employment and financial stability. Portfolio adjustments were communicated well in advance, based on pre-set parameters, and thereby not determined by relative price changes.

Next, banks are the largest MBS investors, holding 30 percent of all MBS in addition to their holdings of portfolio loans. Banks increased their MBS holdings from $2.2 trillion to $3.1 trillion over 2020-2022q1 (a 41% increase). DSSS shows that this increase largely resulted from the surge in bank deposits over this period combined with the desire for banks to invest these deposits in long-term fixed-rate assets. This "bank deposit channel" explains why banks meaningfully increased their MBS holdings–despite less attractive pricing. Other investors (such as mutual funds, and pension funds) are price sensitive and sold MBS over 2020-2022q1 and bought afterwards, but their purchases and sales were smaller than those of the price-insensitive Federal Reserve and banks.

The end result is that monetary policy is transmitted to the housing market not just through changes in economy-wide borrowing costs, but by changes in the supply of mortgage credit held by the Federal Reserve and banks. An easing in monetary policy (including Federal Reserve purchases of MBS) causes the Federal Reserve and banks to increase their demand for mortgage credit (and by more than decreased demand by other investors), such that mortgage rates not only fall, but fall by more than Treasury yields, thereby compressing the mortgage spread. A tightening in monetary policy (including reductions in the Federal Reserve's MBS holdings) works in the opposite direction, causing mortgage rates to increase faster than Treasury yields and widening the mortgage spread.

The paper then reports a series of empirical tests over the period 2010-19 to calculate key beta coefficients and see if the patterns in the data are consistent with these transmission channels, before using these estimates to calculate counterfactuals of what would have happened to mortgage spreads, originations and net issuance if there had been no Fed or bank MBS purchases in response to Covid. The

resulting estimates of the magnitudes of these two amplifying transmission channels are very large. For example, the counterfactual exercise suggests that of the 113 bps decline in the mortgage spread from 2020 to 2021, Fed MBS purchases explain 38bps and bank MBS 43bps; in other words—these two transmission channels decreased the mortgage spread by 81 bps—equivalent to about half the average mortgage spread over 2010-19. DSSS then links this to mortgage originations and finds that Fed and bank purchases explain just under $3 trillion of mortgage originations over 2020-23—about one-quarter of the total wave of originations supporting the housing market over this period.

The empirical analysis and counterfactuals are carefully done—but the estimates are so large that a logical question is how well parameter estimates from the period before the pandemic apply. There were a number of unusual macroeconomic developments around the 2008 crisis and subsequent decade (which is the baseline for the estimates), as well as around the pandemic. For example:

- The collapse of the housing market in the 2008 crisis led to unusual strains in housing finance over the subsequent decade, which could lead to larger estimates of the impact of MBS purchases by banks and the Fed over this period than would occur during other windows.
- The increase in bank deposits at the start of the pandemic could reflect the large US fiscal stimulus, combined with restrictions on households' ability to spend their cash due to Covid restrictions, rather than the impact of low interest rates (as occurs through the bank deposit channel in other windows).
- The increase in mortgage spreads after the pandemic could reflect the sharp increase in uncertainty about the future path of interest rates and corresponding increase in the volatility of interest rate futures, unlike during the pre-pandemic QT when

it was expected that policy rates would continue to be low for an extended period.

Distinguishing these various effects is not straightforward and suggests any estimates of the magnitudes of these relationships should be interpreted cautiously. Economic relationships during the 2008-2019 period may be meaningfully different than over 2020-23, particularly as there is no good historical precedent for the movements in many key macroeconomic variables around the pandemic cycle (see Forbes et al., 2024).

3. QT Announcements: Impact on Rates and Spreads in Mortgage Markets

To provide a cross-check on some of the empirical estimates in DSSS and better understand these relationships during the 2020-23 period, this section focuses on one of the highlighted transmission channels: from Federal Reserve balance sheet policy to mortgage rates and spreads. More specifically, I summarize the (limited) results in the academic literature and then extend the analysis in Du, Forbes and Luzzetti (2024) to test how Federal Reserve QT announcements impact mortgage and MBS rates, Treasury yields, and the corresponding spreads—both before and after the pandemic.

3.1 *Previous Evidence: Impact of QE and QT Announcements*

Although there is an extensive literature estimating the impact of US QE on a range of financial market variables, surprisingly few papers have estimated the impact on mortgage rates, and almost none (to my knowledge) on mortgage spreads. Only one paper, Krishnamurthy and Vissing-Jorgensen (2013), focuses on the impact of QE programs on MBS and mortgages, with detailed empirical and theoretical analysis of the different channels through which asset purchases can have different effects on MBS and Treasury markets.

Table 1 summarizes this limited research linking US QE and QT directly to MBS yields. Each of the programs listed on the table include Federal Reserve announcements of net purchases/unwind of both Treasuries and MBS except for QE-2 (which only included Treasuries) and QE-3 (which only included MBS).[2] Krishnamurthy and Vissing-Jorgensen (2012, 2013) and Gagnon et al. (2011) estimate that the cumulative effect of their QE-1 events was to reduce yields on 30-year MBS by a cumulative 107 bps and 113 bps, respectively.[3] Estimates of the impact of other QE programs tend to be much smaller, sometimes close to zero, and usually insignificant. Estimates of the post-pandemic QE are larger than for QE-2, but about one-third that for QE-1.

Estimates of the impact of QT on mortgage rates are reported at the bottom of Table 1 and are even more limited. Smith and Valcarcel (2023) estimates that the impact of QT-1 announcements, which they define as including information on the tapering of QE-1, increased 30-year MBS by an insignificant 46bps; when they only focus on the impact of tapering announcements, however, the estimated impact becomes significant (although only increases by 2bps). Casalena (2024) does not include tapering announcements and finds much smaller effects of QT-1 (2017-2019) and QT-2 (2022-2024) on MBS—an insignificant 1 bps and borderline significant 5 bps, respectively.[4]

The direction and relative magnitudes of these estimates support earlier work; QE corresponds to a reduction in yields on a range of assets and QT corresponds to an increase in yields. These effects would

[2] More specifically, in QE-2 the Federal Reserve used principal repayments from its agency holdings to purchase long-term Treasury bonds (but not MBS). In QE-3 the Federal Reserve made additional purchases of MBS, but not Treasuries. In MEP, the Federal Reserve announced it would reinvest principal payments from its holdings of agency debt and MBS into MBS (leading to a net increase in MBS purchases), as well as extend the maturity of its portfolio by purchasing long-term Treasuries and selling short-term Treasuries. See Krishnamurthy and Vissing-Jorgensen (2013) for details on each program.

[3] Krishnamurthy and Vissing-Jorgensen (2012) also estimates the impact on yields of 15-year MBS and agency debt of a range of maturities. The estimated effects range from -88 to-200bps during QE1 and -8 to -29 for QE2.

[4] Casalena (2024) uses an alternate measure of MBS yields: the MBS yield-to-worst for interest rates on 30-year mortgages.

be expected even if the Fed was not purchasing (or unwinding) its MBS holdings due to standard signaling or portfolio rebalancing effects, the which affect demand for a range of bonds and other assets that are not part of Federal Reserve's balance sheet programs. Also, research shows that QE corresponds to a larger reduction in yields during periods of market stress and illiquidity (e.g., during QE-1), and the more muted effects of QT relative to QE (with the sign reversed) at least partly reflect calmer market conditions when central banks shrink balance sheets (Du et al., 2024).

The main contribution of DSSS, however, is not these types of estimates of the impact of balance sheet policies on mortgage or MBS rates, but on the corresponding spreads (i.e., relative to that of US Treasuries). An easing (tightening) of monetary policy should reduce (increase) MBS and Treasury yields, but the key channels laid out in the paper suggest the impact on MBS yields should be greater than for Treasuries, an effect captured in the relative spread. To see if there is evidence supporting this, the right column in Table 1 reports estimates from the same studies of the impact of different QE and QT episodes on US Treasury yields.

The evidence on whether US balance sheet policies affect MBS spreads (instead of simply affecting MBS yields) is mixed. In some cases, the estimated effect of balance sheet adjustments on MBS yields is larger than for Treasuries—such as for QE-1 in Gagon et al. (2011), for the MEP and QE-3 in Krishnamurthy and Vissing-Jorgensen (2013), for the pandemic QE in Casalena (2024), and for QT-1 in Smith and Valcarcel (2023). In other cases, however, there is no clear difference in the effects on MBS relative to Treasury yields, and even in some of the cases where there are modest differences, these are unlikely to be statistically significant. Moreover, one of the examples with the largest impact on the difference between MBS and Treasury yields is for QE-3—which is not surprising as this is the one episode when QE only involved net purchases of MBS (and not Treasuries).

One final note of caution for this series of results is that most of this literature focuses on the effects of QE in the period immediately after the collapse in the housing market. During this period, Federal Reserve purchases of housing-related assets would be expected to have a larger impact through channels such as the "capital constraint" and "scarcity" channels, as the market for housing finance was more constrained (see Krishnamurthy and Vissing-Jorgensen, 2013).

3.2 *New Evidence: Impact of QT Announcements*

To test for the impact of US balance sheet policies on MBS spreads more systematically, and to better understand the post-pandemic experience with QT that is the focus of DSSS, I extend the data and framework developed in Du, Forbes and Luzzetti (2024). Du et al. (2024) compiles a timeline of QT events since 2020 for a sample of seven advanced economies and then estimates their impact on a range of financial market variables—but not MBS or mortgage rates. I replicate their framework, and use their US QT announcement dates, but now estimate the impact on the seven variables related to the housing market used in DSSS (kindly provided by the authors):

- *Mortgage Rate*: primary mortgage rate (daily, 30-year fixed rate, conforming mortgage index).
- *MBS Rate*: 30-year rate (FNCL par coupon index).
- *Treasury Yield*: 10-year market yield on U.S. Treasury Securities (constant maturity, quoted on an investment basis).
- *Mortgage Spread*: *Mortgage Rate* to *Treasury Yield*.
- *MBS Spread*: *MBS Rate* to *Treasury Yield*.
- *Option-adjusted MBS Spread*: *MBS Spread* that removes the estimated value of the prepayment option and other components such as mortgage fees.

Next, I adapt the cross-country model in Du et al. (2024) in order to apply the framework to one country (the United States), and use daily data from January 2014 through September 2023 to estimate:

$$\Delta y_t = \alpha + \beta QT_t + \gamma IntSurprise_t + \delta EconSurprise_t + \varepsilon_t \ . \ (1)$$

The Δy_t is the change in the relevant rate, yield, or spread listed above over the two days from *t-1* (i.e., the closing price the day before the QT event) through *t+1* (i.e., the closing price the day after the QT event). The QT_t is a dummy equal to 1 if a QT event occurs on date t.[5] The other explanatory variables control for monetary policy and economic data at time t that could affect the left-hand side variables; $IntSurprise_t$ is any surprise in the policy interest rate (measured as the difference between the policy rate announced on t relative to Bloomberg median expectations from market analysts on *t-1*)[6] and $EconSurprise_t$ is other economic data news (measured as the change in the Citigroup Economic Surprise Index over the same two-day window).[7]

The results for all U.S. QT announcements since 2020 (also referred to as QT-2 or the post-pandemic QT) are reported in the top panel of the Appendix Table. Post-pandemic QT announcements are correlated with a significant increase in mortgage and MBS rates of 10-11bps. QT announcements are also correlated with a similar (and significant) increase in Treasury yields, however, such that the impact on the mortgage and MBS spreads is insignificant and basically zero. When the MBS spread is adjusted for the estimated value of the prepayment option and other components, however, the coefficient becomes positive and marginally significant, consistent with the thesis in DSSS. The magnitude suggests individual QT-2 announcements

[5] In the initial analysis reported below, I only focus on QT events classified as "main announcements" in Du et al. (2024). These are events that provide concrete information on the date and/or magnitudes of QT and do not include events defined as "preliminary discussions" (which are more general principles and frameworks for QT programs without specifics). Du et al. (2024) shows that "preliminary discussions" had no significant effect on any financial market variables.

[6] If analyst expectations are not available in Bloomberg (often before 2020), I use the difference relative to the comparable OIS rate on *t*-1.

[7] All regressions are estimated with robust Newey-West standard errors with 5-day lags to adjust for any serial correlation, including that introduced by the two-day windows. I also exclude the day before the QT announcement and the four days after in order to avoid treating any market news just before the announcement or any lagged effects as being a "non-event" day. These exclusion windows have no impact on key results. See Du et al. (2024) for details and sensitivity tests.

increased the option-adjusted MBS spread by 4 bps, and when aggregated across the three "main announcements" of new or faster QT, aggregates to a total impact of +12 bps.[8]

Next, I extend this analysis to test if QT announcements had different effects after the pandemic as compared to QT-1 or all US QT announcements. Regression results are reported in the Appendix Table, but for ease of reference, Figure 2 compares the key coefficient estimates for the QT dummy in equation 1 for: (1) the full sample period; (2) QT-1/before the pandemic; or (3) QT-2/after the pandemic.[9] The estimates suggest that QT events before the pandemic had much smaller effects on each financial variable. In fact, the only significant effects of QT announcements (at the 5% level) on any of the variables occurs during the post-pandemic QT. This more muted effect of QT before 2022 could reflect the more gradual roll out and slower pace of QT-1—consistent with Chair Yellen's description of it being comparable to "paint drying".[10] This is also consistent with QT-2 being interpreted as providing a stronger signal of central bank commitment to higher interest rates than with QT-1 (as discussed in more detail in Du et al., 2024).

While the effects of QT-2 announcements on mortgage rates and spreads are consistent with the discussion in DSSS of how Federal Reserve balance sheet policies affect mortgage markets, the magnitude appears to be weaker than estimated in DSSS. More specifically, DSSS estimates that the impact of the pandemic QE was to reduce mortgage spreads by about 42 bps.

There are several possible explanations for why the estimates reported above are smaller than those in DSSS. First, the empirical analysis in DSSS focuses on the impact of QE after the 2008 financial crisis, rather than QT, and research suggests QE had a greater impact

[8] See the appendix in Du et al. (2024) for details on these three events.
[9] The full sample period is from 01/01/14 – 09/28/23. The subsample used to estimate the effects of QT-1 ends on 12/30/19, and that used for QT-2 begins on 01/01/21.
[10] See the June 2017 Post-FOMC Press Conference by Chair Janet Yellen. Available at https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20170614.pdf

on a range of variables than QT as it occurred in periods of heightened market stress and reduced liquidity (as discussed above, and particularly in the housing market). Second, the Federal Reserve purchased about $1 trillion of MBS during the pandemic-QE, while it has only reduced its holdings by about $300bn during the post-pandemic QT (with the much slower pace expected to continue given the slow rate of mortgage refinancing). Finally, the QT announcements that are the focus of the event study above may have been expected by investors, such that some of the effects on yields and spreads were incorporated in advance—a standard concern in event studies. Although the negative and significant impact of QT-2 announcements on mortgage, MBS and Treasury yields suggests that there was still some news in the QT announcements, the extent to which these announcements were expected could generate a downward bias in coefficient estimates and underestimate the effects of QT events.

To further explore the extent of any such bias from QT events being priced into yields and spreads in advance, I re-estimate equation 1, but now focus on the longer time period (that includes QT-1 and QT-2) and then examine the impact of the QT announcements that were a *Surprise* compared to those that were not a surprise. [11]

The resulting effects are reported in Figure 3 and should be interpreted cautiously as the number of QT announcements in each group is very limited. With this caveat, the *Surprise* announcements had a larger impact on mortgage and MBS rates (as compared to *non-Surprise* events), but also on Treasury yields, such that the combined effect is an increase in mortgage and MBS spreads of 2-3bps per each QT event, for a cumulative impact of 8-12bps across all four *Surprise* events (including for the option-adjusted spread)—very similar to results when not controlling for the "surprise" component of the

[11] I use the approach and definitions from Du et al. (2024) to classify individual QT events as a "surprise". As noted in this paper, this classification is not straightforward and requires a fair degree of judgment. Results are similar if I instead estimate the impact of each individual QT announcement and then compare the average impact of the QT surprise events relative to the other QT events.

announcement. The *Surprise* announcement that QT would be ended sooner than expected on March 2019 corresponded to a sharp fall in mortgage and MBS rates (of about 10bps), but also only had a modest impact on the corresponding mortgage and MBS spreads (of 1 to 2 bps). Overall, these results continue to suggest that QT announcements effect mortgage spreads in the direction predicted in DSSS, but the magnitude of the effects may be more modest than of those presented for QE (in reverse)—even when focusing on the smaller number of QT announcements that were more of a surprise.[12]

To conclude, this analysis suggests that QT tends to increase MBS and mortgage rates, but has similar and only slightly smaller effects on Treasury yields, so that the impact on mortgage and MBS spreads is positive but fairly muted. The effects are consistent with the transmission of QE/QT programs to mortgage markets as discussed in DSSS, although the magnitude appears to be smaller than suggested by their analysis. At least some of this difference likely reflects that estimates of the impact of early QE programs tend to be larger as markets were illiquid, particularly for housing-securities after the 2008 crisis. As a result, estimates of relationships between Federal Reserve balance sheet policies and yields (particularly for housing securities) based on the early window (and used for the counterfactual in DSSS) likely overstate the impact of balance sheet policies in other periods. These differences in magnitudes, however, could also reflect the smaller effects generally found in QT programs in general (as compared to the QE that is the focus of DSSS' empirical estimates), as well as the smaller magnitude of QT in the United States to date than in other countries (Du et al., 2024), as well as other shortcomings in the event-study approach used above.

[12] Du et al. (2024) also finds that adjusting for whether QT events were a surprise only has a modest impact on coefficient estimates.

4. Insights from the Cross-Country Evidence?

There has been substantial macroeconomic volatility during periods when the Federal Reserve adjusted its MBS holdings; not only was the period around the 2008 crisis unusual in the collapse of the housing market, but Forbes et al. (2024) documents the many ways in which the pandemic rate cycle was unusual—if not unprecedented—based on the historical experience. Isolating the direct impact of specific policy changes on any macroeconomic variable is extremely challenging during these periods; the relationships between some macroeconomic variables may change meaningfully across different windows, and it can be difficult to identify relationships when multiple macroeconomic variables simultaneous experience large movements. Could some of the effects of Federal Reserve balance sheet policies discussed above and in DSSS reflect other news or events that occurred over the periods when the Federal Reserve adjusts its MBS holdings? Could differences in the macroeconomic environment during the 2010's relative to the early 2020s explain differences in the effects of balance sheet policies in these different periods?

More specifically, as inflation picked up in 2022, Federal Reserve meetings, speeches, and announcements that included information on QT often included guidance (whether formal or not) suggesting monetary policy would be tightened more than previously expected. This also occurred in a macroeconomic environment during which the recovery and inflation was stronger than expected, involving a constant reassessment (usually upward) for the path of interest rates. Could the estimated impact of Fed QT-2 announcements on mortgage markets reflect this increase in interest rate volatility, more uncertainty about the future path of interest rates, or other changes in the macroeconomic environment—rather than the direct impact of balance sheet policy? Could the even more muted effects of QT-1 on the mortgage market reflect the macroenvironment in the 2010s (i.e., low inflation, slow growth, and a lower and flatter expected path for

interest rates) rather than any impact of changes in the Federal Reserve's balance sheet policy?

In order to better control for the broader macroeconomic environment and identify the effects of balance sheet policy on the mortgage market, one potentially fruitful approach could be to analyze these transmission channels in economies that did and did not purchase (or unwind) mortgage securities, but which otherwise faced similar macroeconomic backdrops. This cross-country, panel approach to better identify the channels discussed above and in DSSS could be particularly useful during the post-pandemic period as many of the sharp swings in macroeconomic variables (including for inflation, policy interest rates, and term premia) were broadly shared across the major advanced economies.

To explore if this cross-country approach could be useful, Figure 4 graphs mortgage spreads for five advanced economies for which data on at least a monthly basis is available (Australia, Canada, New Zealand, Sweden, and the US) from just before the COVID-19 pandemic through September 2023.[13] Central banks in each of these economies not only raised interest rates sharply, but implemented QT over 2022-2023. The United States, however, is the only one for which the purchase and unwind of MBS has been a major component of their QE/QT programs, with purchases of MBS occurring over March 2020-March 2022, and MBS holdings rolling off the balance sheet (subject to caps) from June 2022.[14]

While it would be dangerous to draw any strong conclusion for a comparison of these mortgage spreads—especially as each is

[13] The mortgage rates used to construct these spreads are not consistent across countries, but in each case the spread is relative to the 10-year yield on government bonds. The mortgage rate is the longest, fixed rate available over the relevant time period on Datastream. This fixed rate is substantially shorter for each country than the 30 years for the US rate. See notes to figure for details.

[14] Other countries have included assets related to housing markets in their asset purchases programs, albeit none to the extent of the Federal Reserve. For example, the ECB has included euro-denominated covered bonds in some of their asset purchase programs and the Bank of Japan has purchased shares in real estate investment trusts (REITs). A number of countries also provided subsidized financing for banks as part of their pandemic response, which could in turn support mortgage lending.

constructed based on different mortgage bonds/contracts—there is not a clear pattern that US mortgage spreads fell more sharply than those in other countries because the Federal Reserve included MBS in its QE programs (with all countries starting QE around March/April 2020). There is also no clear pattern suggesting that these mortgage spreads rose more quickly in the United States than in other countries when the Federal Reserve included MBS in its QT programs.[15]

A closer look at the data underlying Figure 4, however, suggests that the ability of cross-country analysis to better understand the transmission of Federal Reserve balance sheet policy to US mortgage markets is limited. The US mortgage market is unique in many measures. It has a larger share of long-term fixed mortgages, and a much larger and more liquid market for MBS. This reflects a number of historical developments—including government support for the US housing agencies (Fannie Mae and Freddie Mac). Most other countries that have used QE and QT do not even have comparable, public daily data on mortgage or MBS rates—making it impossible to repeat the event studies reported above for other countries.

5. Lessons for Policy: Should Mortgage Bonds be included in Quantitative Easing Programs?

If adjustments to central bank holdings of MBS affect mortgage markets not just through their effects on general borrowing costs, but also the additional effects discussed in DSSS, there are a number of important considerations for central banks' balance sheet policies. I will discuss two. (1) Should countries that <u>have</u> included MBS as central to their QE programs (i.e., the United States) continue to do so in the future? and (2) Should countries that <u>have not</u> included mortgage securities (i.e., most other countries) do so in the future?

[15] The dates when the other economies in the figure announced the start of QT are: 05/03/22 in Australia, 04/13/22 in Canada, 02/23/22 in New Zealand, 04/28/22 in Sweden.

MBS have been a central component of the US Federal Reserve's QE programs and subsequent balance sheet adjustments. In fact, the Federal Reserve has generally included both Treasuries and MBS when it starts a major new QE or QT program, or when it announces plans to taper any ongoing purchases (albeit with different magnitudes to reflect different market sizes). This made sense when the Federal Reserve began its QE program in response to the collapse of the housing market and corresponding financial crisis in 2008. The housing market was at the core of systemic financial vulnerabilities—and supporting the US housing market was central to stabilizing financial markets and supporting a broader economic recovery.

But does this largely symmetric treatment of Treasuries and MBS make sense in other situations that merit QE (or QT)? More specifically, when the Federal Reserve restarted asset purchases from March 2020 through March 2022, should it have purchased MBS as well as Treasuries?

There were a number of reasons to initially include MBS in the QE that was started in 2020 in response to the pandemic. As economic activity collapsed, liquidity dried up, and the "dash for cash" threatened market functioning, there was a case to buy a wide range of assets to stabilize financial markets. Speed and scale were of the essence. Rolling out a program similar to that used in the past was not only fast, but including MBS would support the larger scale believed to be required. By simply repeating the former playbook, there was no discussion of special preference (or not) for a specific market (i.e., housing), which could introduce calls for preferential treatment for specific sectors in the future (such as for climate-friendly bonds or manufacturing). If a larger scale or scope of purchases was needed than could be required with Treasuries, purchasing other assets (such as corporate or municipal bonds) was less attractive than MBS as it would involve developing new programs and introduce a host of additional concerns around corporate governance and moral hazard.

After the initial period of financial turmoil in the spring of 2020, however, the housing market quickly recovered—and then took off. Housing prices picked up to above pre-pandemic highs—spurred by a combination of people prioritizing more space and homes away from urban centers, combined with lower mortgage rates and fiscal support boosting incomes. The housing market appeared to be more at risk of overheating and potentially contributing to future vulnerabilities, rather than of collapsing. If Federal Reserve purchases of MBS further fueled this boom through the channels discussed in DSSS—and in addition to the boost from holding interest rates around zero and purchasing US Treasuries—these MBS purchase should have been ended sooner. Even if uncertainty about the sustainability of the broader economic recovery justified a continuation of highly accommodative monetary policy, it should have been possible to keep policy rates around zero and continue Treasury purchases, but move forward the tapering and then end of MBS purchases (and thereby reduce the risks from an overheated housing market in the future).[16]

Another reason for asymmetric treatment of MBS and Treasuries in any QE program in the future is the greater difficulty unwinding MBS holdings. For most countries (including the United States), the primary method for reducing central bank bond holdings is passive QT—i.e., allowing bond holdings to roll-off central bank balance sheets when they expire. The rate of passive run-off varies meaningfully across countries based on the maturities of their holdings (and any caps/limits on run-off). In the United States, a large volume of Treasuries held by the Federal Reserve expire each month, so that it is straightforward to shrink this portion of the balance sheet gradually over time through passive QT.[17] On the other hand, MBS tend to run off more slowly and irregularly, particularly in an environment of elevated interest rates (such as today), which reduces the incentive for

[16] Granted, this would have required careful communication so that the tapering of MBS purchases was not interpreted as a signal of tapering other asset purchases or an earlier increase in interest rates. This would likely have required advance discussion of why the treatment of MBS and Treasury securities were not automatically symmetric.
[17] See Du et al. (2024) for details and a simulation for the future.

households to move and/or refinance their mortgages. The roll-off of MBS from the Federal Reserve balance sheet is so slow during QT-2 that it has not even met the monthly cap most months. Given this greater difficulty reducing balance sheet holdings of MBS than Treasuries, any future QE programs should prioritize making any balance sheet adjustments through Treasuries (barring a clear reason why the housing market needs support).

Shifting from the US to other economies, should other central banks consider placing more emphasis on MBS or similar housing-related finance as part of any asset purchases programs or balance sheet management? The analysis in DSSS suggests that this could be a powerful transmission mechanism for monetary policy.

As discussed above, however, no country has a deep, liquid market for long-term mortgage securities comparable to that for the United States. This would make it substantially more difficult for other central banks to include large-scale mortgage bond purchases in QE programs aimed at supporting the broader economy. Purchasing bonds of one specific sector—especially in a less liquid market—would introduce a host of additional concerns around corporate governance and distortions to market pricing. In cases where specific support for the housing sector is merited, mechanisms other than central bank asset purchase are likely to be better places to start—such as programs supporting bank lending for mortgages (particularly in countries where banks are the dominant providers of mortgage financing). Moreover, as shown in DSSS, the deposit channel of banks should support housing markets—above and beyond the direct impact of lower policy rates—even in the absence of central bank purchases of mortgage bonds.

6. Conclusions

The paper by DSSS is a useful resource for anyone interested in understanding the channels by which monetary policy is transmitted

to the housing market. Easing and tightening monetary policy can affect the housing market not only through the direct impact on general borrowing costs, but also through additional channels related to changes in the demand for MBS by price-insensitive buyers (banks and the Federal Reserve). New empirical results reported in this discussion are consistent with Federal Reserve purchases of MBS reducing mortgage rates meaningfully, and generating a more modest reduction in mortgage spreads (relative to Treasury yields). Identifying the precise magnitude of these effects in this unusual period of heightened macroeconomic and financial volatility, however, is challenging.

This deeper understanding of how monetary policy, and particularly central bank balance sheet policy, is transmitted to the mortgage market raises important questions for the future. If the Federal Reserve is forced to resort to large-scale asset purchases again, should it automatically include mortgage-backed securities? When does the housing market merit the additional support from the channels discussed in DSSS as well as those from changes in economy-wide borrowing costs? This discussion suggests the Federal Reserve should be more judicious about including MBS in any QE programs in the future, especially as it is more difficult to unwind these holdings than for Treasuries. The upcoming Strategic Review could be an opportune time to consider different scenarios and develop general principles to guide exactly what to include if asset purchase programs are required at some point in the (hopefully distant) future.

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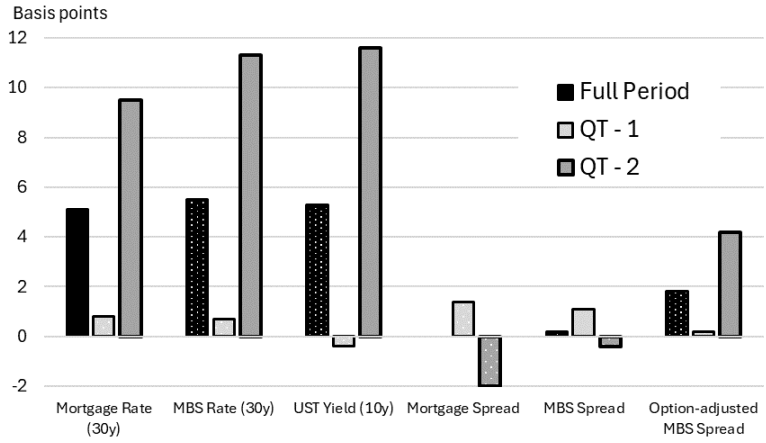
Table 1
Previous Evidence: Effects of US QE and QT on MBS and Treasury Yields

Research Paper	Episode	30y MBS yields (bps)	10y UST yields (bps)
QE Episodes			
Krishnamurthy & Vissing-Jorgensen (2012, 2013)	QE-1	-107	-107
Gagnon, Raskin, Remache & Sack (2011)	QE-1	-113	-91
Krishnamurthy & Vissing-Jorgensen (2012)	QE-2	-8	-30
Krishnamurthy & Vissing-Jorgensen (2013)	QE-2	-12	-18
Krishnamurthy & Vissing-Jorgensen (2013)	MEP	-23	-7
Krishnamurthy & Vissing-Jorgensen (2013)	QE-3	-15	-3
Casalena (2024)	Pandemic QE	-34	-4
QT Episodes			
Smith & Valcarcel (2023)	Taper 1+ QT-1	+46/+48	+28/+29
Casalena (2024)	Taper 1	+7	+7
Casalena (2024)	QT-1	+1	0
Casalena (2024)	Taper 2	+2	+2
Casalena (2024)	QT-2	+5	+5

Notes: Results reported above are coefficient estimates from event studies estimating the effects of US QE and QT announcements on the yields reported on the right. All episodes listed above include Federal Reserve purchases (or roll-off) of both Treasuries and MBS, except QE2 (which only includes Treasuries) and QE3 (which only included MBS).
Sources: Estimates are taken directly from the research papers listed in the left column.

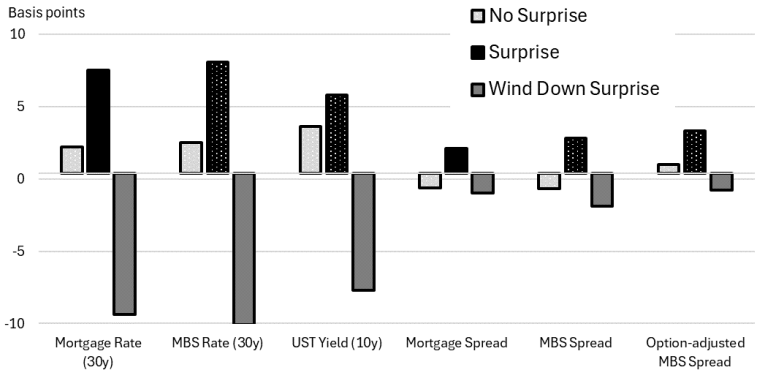
Figure 2
Impact of US QT Announcements on Mortgage Yields and Spreads



Notes: Chart shows coefficient estimates for QT dummy in equation (1) explaining the two-day return of the variables listed on the x-axis. QT dummies are dates of "major announcements" of news related to QT in the United States. Regressions also control for interest rate surprises and other economic data news. Regressions for QT-1 include daily data from 2014-2019 and for QT-2 from 2021-2023 (Sept). Regressions for Full Period include QT-1 and QT-2 windows. Bars have white dots if the coefficient estimate is not significant at the 10% level.

Sources: Based on regression estimates of equation (1) in text. Data for variables listed at the bottom is from DSSS and for other variables from Du et al. (2024).

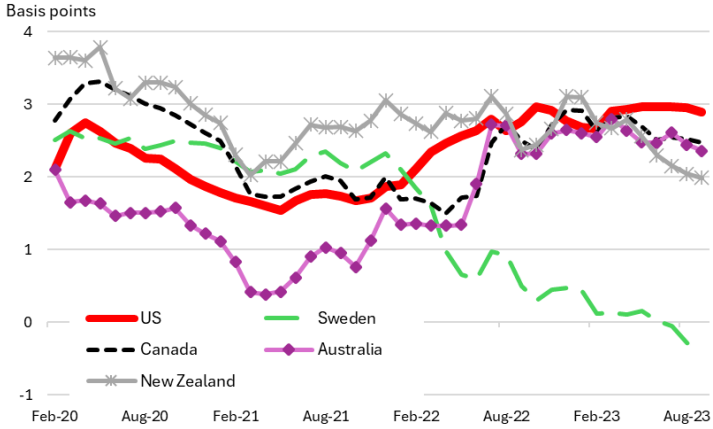
Figure 3
Impact of US QT Announcements: "Surprise" versus "non-Surprise" Events



Notes: Chart shows the effect of QT announcements that are a surprise or not a surprise, based on classifications in Du et al. (2024). Each regression includes all QT events that involve information on new or additional QT, except the "Wind Down" surprise, which is the announcement on March 20, 2019 that QT would be ended sooner than expected. Regressions explain the two-day return for the variables listed on the x-axis using daily data from 2014-2023 (Sept) and control for interest rate surprises and other economic data news. Bars with white dots indicate the QT dummy is not significant at the 10% level.

Sources: Based on regression estimates of equation (1) in text. Data for variables listed at the bottom is from DSSS and other data and classifications from Du et al. (2024).

Figure 4
Mortgage Spreads in Advanced Economies



Notes: Chart shows mortgage spreads for each economy, defined as the difference between the mortgage rate and the 10-year government bond yield. The definition of the mortgage rate varies meaningfully across countries based on data availability. In each case, I use the rate for the longest term loan available.

Sources: Data on mortgage rates and yields is from Datastream for all countries except the US. Data on mortgage rates for each country is: Australia—bank lending rate for housing loans, 3-year fixed; Canada—conventional mortgage lending rate, 5-year term; New Zealand—new residential mortgage interest rate, 5-year term; Sweden—average mortgage rate for major banks, 10-year term. Data for the US is from DSSS, with the mortgage rate the 30-year fixed rate.

Appendix Table
Regression Results: Impact of US QT Events

Post-Pandemic QT (2021-2023 (Sept)

	Yields/Rates			Spreads		
	Mortgage Rate (30y)	MBS Rate (30y)	US Treasury Yield (10y)	Mortgage Spread	MBS Spread	Option-adjusted MBS Spread
QT Dummy	0.095***	0.113**	0.116***	-0.020	-0.004	0.042*
	(0.037)	(0.053)	(0.033)	(0.016)	(0.023)	(0.024)
Interest Rate Surprise	-0.154***	-0.852***	-0.719***	0.565***	-0.133***	-0.669***
	(0.043)	(0.064)	(0.045)	(0.023)	(0.028)	(0.028)
Economic Data Surprise	1.922***	2.888***	1.917***	-0.059	0.971***	0.849***
	(0.504)	(0.742)	(0.524)	(0.314)	(0.325)	(0.326)
Observations	***358***	***360***	***360***	***357***	***360***	***360***
R2	***0.063***	***0.063***	***0.067***	***0.023***	***0.026***	***0.046***

Pre-Pandemic QT (2014-2019)

	Yields/Rates			Spreads		
	Mortgage Rate (30y)	MBS Rate (30y)	US Treasury Yield (10y)	Mortgage Spread	MBS Spread	Option-adjusted MBS Spread
QT Dummy	0.008	0.007	-0.004	0.014	0.011*	0.002
	(0.008)	(0.011)	(0.014)	(0.011)	(0.006)	(0.008)
Interest Rate Surprise	-0.095	0.055	0.301	-0.229	-0.246	-0.186
	(0.192)	(0.344)	(0.234)	(0.145)	(0.215)	(0.143)
Economic Data Surprise	0.540*	1.416***	1.589***	-0.645***	-0.173	0.044
	(0.302)	(0.368)	(0.363)	(0.216)	(0.140)	(0.201)
Observations	***420***	***825***	***825***	***418***	***825***	***823***
R2	***0.009***	***0.022***	***0.030***	***0.024***	***0.010***	***0.003***

Full Period (2014-2023, Sept)

	Yields/Rates			Spreads		
	Mortgage Rate (30y)	MBS Rate (30y)	US Treasury Yield (10y)	Mortgage Spread	MBS Spread	Option-adjusted MBS
QT Dummy	0.051*	0.055	0.053	0.000	0.002	0.018
	(0.026)	(0.036)	(0.032)	(0.013)	(0.014)	(0.015)
Interest Rate Surprise	-0.087	-0.370	-0.163	0.202	-0.208*	-0.444***
	(0.102)	(0.316)	(0.307)	(0.213)	(0.109)	(0.151)
Economic Data Surprise	1.374***	2.130***	1.760***	-0.296	0.370**	0.426**
	(0.319)	(0.394)	(0.313)	(0.210)	(0.171)	(0.188)
Observations	***778***	***1,185***	***1,185***	***775***	***1,185***	***1,183***
R2	***0.038***	***0.039***	***0.037***	***0.007***	***0.009***	***0.020***

Notes: Chart shows regression results for equation (1) explaining the two-day return of the variables listed at the top. QT dummies are dates of "major announcements" of news related to QT in the United States. Estimated on daily data over the time period noted above each section of the table, but the day before the QT event and four days after are excluded, as well as periods of heightened market turmoil in 2020 and around the SVB collapse. Newey-West standard errors with 5-day lags to adjust for serial correlation. ***, **, and * denotes significance at the 10%, 5% and 1% levels, respectively.

Sources: Author's calculations. Data for variables listed at the bottom is from DSSS and for other variables from Du et al. (2024).