LESSONS FROM HISTORY FOR SUCCESSFUL DISINFLATION

ONLINE APPENDIX D:
IDENTIFICATION OF DAYS USED IN THE HIGH-FREQUENCY ANALYSIS

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Overview. This appendix describes how we identify dates in the 2021–2022 period when there were large increases in the nominal 2-year Treasury interest rate that were primarily attributed to new information about monetary policymakers' commitment to disinflation. As described in Section 5.2.2 of the paper, we begin by finding days over the period June 16, 2021–November 7, 2022 when the 2-year rate rose by 8 or more basis points. As explained in the paper, we then use three criteria to determine which of these days to include in the sample: whether the increase was attributed mainly to Federal Reserve commitment; whether no significant other reason for the increase was given; and whether the description reported actual new information about that commitment.

To identify the increases that satisfy these criteria, we examine articles in the *New York Times* and the *Wall Street Journal*. Both the *Times* and the *Journal* generally have an article summarizing market developments and describing what appeared to be the main reasons for those developments each day that markets are open. (The *Times* articles on market developments are often supplied by the Associated Press; also, occasionally there is a separate article specifically about developments in bond markets, especially in the *Journal*.) We always begin with the article on market developments in the *New York Times*. In cases where that article identifies a data release as the main source of the rise in interest rates, we rule the day out without investigating further. For the remaining days, we also examine the *Wall Street Journal* article on market developments. In addition, we search for other potentially relevant articles in both publications on both the day of the increase and the next day. Our searches are broad, encompassing such search terms as "interest rates," "bond," "bonds," and "Federal Reserve." The searches typically return many articles in addition to ones relevant to our analysis, and we did not find any cases where our initial search appears to have missed any relevant articles.

The end result of this process is that we find seven days that clearly meet all three criteria. These comprise our "narrow" sample. Five additional days clearly satisfy the first two criteria but are somewhat questionable regarding the third, generally because the descriptions in the *Times* and the *Journal* attribute the increase to market participants reevaluating recent news about the strength of monetary policymakers' commitment to disinflation, rather than to fresh news about their commitment. We include these five days in our "broad" sample.

Here, we first provide descriptions of the evidence from the *New York Times* and the *Wall Street Journal* for each day we include in the samples. We then briefly describe the evidence that leads us to exclude the remaining days with significant increases in the 2-year rate. Fortunately, with only one exception (described below under 11/22/2021), none of the articles we examined make any mention of changes in interest rates on inflation-protected securities, so we were able to determine what days to include in the sample with essentially no knowledge of what happened to those rates.

Days in the Narrow Sample. We begin with the seven days in our narrow sample, ordered from the largest to the smallest increase in the 2-year rate.

3/21/2022 (17-basis-point increase in the 2-year rate). The *New York Times* reported in its article about market developments, "Federal Reserve Chair Jerome Powell said the central bank was prepared to move more aggressively if need be to contain inflation. Bond yields rose sharply following Powell's remarks" (3/22/2022, p. B.2). And a *Times* article specifically about Powell's remarks said, "His comments were the clearest statement yet that the central bank was ready to forcefully attack rapid price increases" (3/21/2022 [no page number]).Similarly, the *Wall Street Journal* article on market developments began, "Investors sold stocks and government bonds after Federal Reserve Chairman Jerome Powell reiterated the central bank's commitment to controlling inflation through a rapid series of interest-rate increases" (3/22/2022, p. B.10). A front-page story in the *Journal* the same day stated, "Federal Reserve Chairman Jerome Powell said the central bank was prepared to raise interest rates in half-percentage-point steps and high enough to slow the economy if it concluded such steps were warranted to bring down inflation" (3/22/2022, p. A.1).

7/6/2022 (15-point increase). The article in the New *York Times* about market developments said, "Wall Street capped another choppy day of trading Wednesday with modest gains for the major stock indexes, after investors combed the minutes from the Federal Reserve's most recent interest rate policy meeting for clues about what the central bank may do next to fight inflation. … The minutes from the Fed's two-day meeting last month show that the central bank's policymakers concluded higher interest rates could be needed to restrain what they saw as a worrying trend: consumers starting to anticipate higher inflation" (7/7/2022, p. B.2). A front-page article in the *Times* the same day said, "Minutes from the Fed's June meeting … made it clear that officials are eager to move rates up to a point where they are weighing on growth as policymakers ramp up their battle against inflation," and, "Fed officials increasingly worry that they need to prove their commitment to pushing prices lower" (7/7/2022, p. A.1). According to the *Wall Street Journal* article on market developments, "Fed officials concluded at their meeting last month that they needed to pick up the pace of interest-rate increases because of an increasingly worrying inflation outlook" (7/7/2022, p. B.11). On its front page, it reported, "The overall tone of the minutes suggest[s] 'the Fed upgraded the inflation problem to a five alarm fire,' said Omair Sharif …. The minutes also revealed officials' growing acceptance that fighting inflation might lead to higher risks of a recession, but they saw that as 'a cost they're willing to pay,' said Michael Feroli" (7/7/2022, p. A.1).

11/22/2021 (11-point increase). The *New York Times*'s article on market developments prominently featured "President Biden's decision to renominate … Jerome H. Powell for another four-year term as chair of the Federal Reserve," and went on to report, "yields on government bonds ticked higher as the day went on, driven in part by expectations that a Fed led by Mr. Powell will ultimately respond to higher inflation by more aggressively raising interest rates" (11/23/2021, p. B.2). Similarly, an article in the *Wall Street Journal* on bond-market developments began, "Yields on U.S. government bonds rose and market-based inflation expectations fell Monday as the prospect of a second term for Federal Reserve Chairman Jerome Powell reinforced bets that the central bank will fight inflation by raising interest rates in the coming years" (11/23/2021, p. B.1).

1/26/2022 (11-point increase). In its article on market developments, the *New York Times* reported, "Jerome H. Powell, the chair of the Federal Reserve, suggested that the central bank could move quickly to raise interest rates as it aimed to cool down inflation" (1/27/2022, p. B.1). And a front-page story in the *Times* on the FOMC's statement and Powell's press conference began, "Jerome H. Powell, the Fed chair, said the central bank could raise rates imminently as officials cut back help for the economy. Federal Reserve officials signaled on Wednesday that they were on track to raise interest rates in March, given that inflation has been running far above policymakers' target and that labor market data suggests employees are in short supply." The article also reported, "'The Fed has completed its pivot from being patient to panicked on inflation,' Diane Swonk, the chief economist at Grant Thornton, wrote in a research note to clients" (1/27/2022, p. A.1). In an article on bond-market developments, the *Wall Street Journal* said, "U.S. government bond yields climbed Wednesday after the Federal Reserve signaled plans to begin raising interest rates in March," and, "Analysts and investors said the move was fueled by Mr. Powell's emphasis on fighting inflation over supporting the economy" (1/27/2022, p. B.11). Another article in the *Journal* quoted Powell saying: "We're prepared to use our tools to assure that higher inflation does not become entrenched" (1/27/2022, p. A.2).

3/16/2022 (10-point increase). The *New York Times* article on market developments did not provide any information about what happened to interest rates (3/17/2022, p. B.2). But a front-page story headlined "Fed Raises Interest Rates in Initial Step Toward Taming Inflation" quoted Powell saying: "We're strongly committed, as a committee, to not allowing this higher inflation to become entrenched, and to use our tools to bring inflation back down to more normal levels"; it also reported, "Powell made clear on Wednesday [3/16] that … the Fed's policy committee knows it needs to act to restore price stability. 'We're not going to let high inflation become entrenched,' Mr. Powell said" (3/17/2022, p. A.1). The article on market developments in the *Wall Street Journal* began, "Stocks climbed in a volatile session and bond yields jumped after the Federal Reserve said it would raise interest rates for the first time since 2018," and also reported, "'It seems very much like they wanted to send a message that they're fighting inflation and they're going to fight it fast and get it under control,' said Kathy Jones"; and somewhat confusingly, it said, "Bond yields rose after the announcement [of the Federal Reserve's interest rate increase]. … The climb in bond yields reflects investors' growing bets that Russia's invasion of Ukraine won't slow the momentum toward higher interest rates" (3/17/2022, p. B1).

4/21/2022 (8-point increase). The *New York Times* reported in its article on market developments, "the Federal Reserve chair, Jerome H. Powell, reiterated that the central bank was preparing to raise interest rates at a quicker pace to cool down inflation" (4/22/2022, p. B.2). A *Times* article that was specifically about Powell's remarks began, "Fed Chair Jerome Powell on Thursday [4/21] signaled that the central bank was prepared to raise interest rates rapidly starting in May as it tries to cool down the economy and prevent fast inflation from becoming a lasting feature" (4/21/2022 [no page number]). In its article on market developments, the *Wall Street Journal* cited Powell's comments as important to the rise in yields, but said of them merely, "Fed Chairman Jerome Powell signaled Thursday that the central bank was likely to raise interest rates by a half percentage point at its meeting next month" (4/22/2022, p. B.1).

4/5/2022 (8-point increase). The *New York Times* article on market developments began, "Stocks closed lower and bond yields jumped Tuesday as remarks by a Federal Reserve governor fueled expectations on Wall Street that the central bank is prepared to more aggressively raise interest rates and take other steps in a bid to tame surging inflation" (4/6/2022, p. B.2). The *Wall Street Journal* article on market developments was headlined, "Stocks Slip on Hawkish Fed Tone—Brainard's comments on inflation measures trigger selloff, as Nasdaq loses 2.3%," and reported, "Fed governor Lael Brainard said at a conference that the central bank is committed to taking steps that will cut inflation this year" (4/6/2022, p. B.13). A *Journal* article about the same event began, "A top Federal Reserve official said the central bank is strongly committed to taking steps that will reduce inflation this year," and reported, "'It is of paramount importance to get inflation down,' Ms. Brainard said," and, "The Fed is 'prepared to take stronger action if indicators of inflation and inflation expectations indicate that such action is warranted,' she said" (4/6/2022, p. A.2).

Days only in the Broad Sample. We next turn to the five days that satisfy our criteria less clearly, and so are in the broad sample but not the narrow one.

6/13/2022 (34-point increase). Both the *New York Times* and the *Wall Street Journal* attributed the rise in interest rates to changing views about the Federal Reserve's commitment to disinflation, but did not cite specific news. The *Times* article about market developments, which was on the front page, said, "Monday's trading ended with reports that the Fed is likely to discuss making its biggest interest-rate increase since 1994 when policymakers meet this week. 'The Fed needs to hike policy rates more aggressively if it has any hope of bringing inflation down,' said Seema Shah" (6/14/2022, p. A.1). Another *Times* article had the headline, "Fed May Eye Biggest Rate Jump Since '94" and reported, "The string of worrying news has caused economists and investors alike to bet that the central bank will begin to raise interest rates at a more rapid clip to signal that it recognizes the problem and is making fighting inflation a priority. 'They've made it pretty clear that they want to prioritize price stability,' said Pooja Sriram, U.S. economist at Barclays. 'If that is their plan, a more aggressive policy stance is what they need to be doing'" (6/14/2022, p. B1). A *Wall Street Journal* article on bond-market developments began, "U.S. government-bond yields jumped to their highest closing levels in more than a decade Monday, propelled by fears that persistent inflation could push the Federal Reserve to raise interest rates higher and faster than expected. … The surge extended in after-hours bond trading, which carried the 10-year yield briefly above 3.4%, following a *Wall Street Journal* report that Fed officials were likely to consider raising interest rates by a larger-than-expected 0.75 percentage point this week to fight inflation" (6/14/2022, p. B1).[1]

11/3/2022 (10-point increase). The *New York Times* attributed the rise to reassessments of likely Federal Reserve actions to combat inflation, but did not cite any specific news. Its article on market developments said, "Treasury yields again rose to multiyear highs Thursday as investors looked ahead to a closely watched job market report from the government that could influence the Federal Reserve's next move in its fight to bring down inflation" (11/4/2022, p. B.2). The *Wall Street Journal* much more clearly attributed the rise to a continued reassessment of the Federal Reserve's commitment to disinflation in light of Powell's statements at his press conference on November 2. Its article about market developments bore the headline, "Yields on Treasurys Jump as Fed Takes Hard Line"; it reported, "Thursday's declines [in stock and bond prices] extended losses that began after Fed Chairman Jerome Powell's Wednesday afternoon warning that high inflation means it is still too soon to think about any pause in the central bank's inflation-fighting campaign," and, "The market response 'shows that Powell did a good job indicating the Fed remains adamantly focused on bringing inflation back into a more subdued range,' said Blair Shwedo" (11/4/2022, p. B.1).

9/22/2022 (9-point increase). The article on market developments in the *Wall Street Journal* began, "U.S. stocks dropped following the latest interest-rate increases from the Federal Reserve and other central banks, which have added to fears that the battle to control rising prices could bring a recession" (9/23/2022, p. B.11). Another article in the *Journal* the same day began, "This time, markets understood quite clearly what the Federal Reserve meant: Inflation is too high and it will likely take a recession to get it down. There is really no other way to interpret the economic and interest-rate projections Fed officials released Wednesday [9/21], and Chairman Jerome Powell's accompanying remarks" (9/23/2022, p. A.2). Yet another article that day had the

[1] The after-hours article began, "A string of troubling inflation reports in recent days is likely to lead Federal Reserve officials to consider surprising markets with a larger-than-expected 0.75-percentage-point interest-rate increase at their meeting this week" (6/14/2022, p. A.1). The after-hours article, together with the reference mentioned above in the *Times* to "reports that the Fed is likely to discuss making its biggest interest-rate increase since 1994," make it natural to wonder if some of the increase on 6/13 reflected the "informal communication" suggested by Cieslak, Morse, and Vissing-Jørgensen (2019).

headline, "Fed Action Pushes 30-Year [Mortgage Rate] to 6.29%," and reported, "The sharp rise is another product of the Federal Reserve's campaign to curb decades-high inflation. On Wednesday [9/21], the central bank raised interest rates for the fifth time this year. Officials indicated that more large increases are on the way even if such moves risk a recession" (9/23/2022, p. A.3). On the other hand, a *Journal* article on bond-market developments put more emphasis on interest rate increases abroad, beginning, "U.S. government bond yields surged Thursday, after foreign governments and central banks rushed to raise interest rates or otherwise support local currencies pressured by the dollar's strongest rally in a generation" (9/23/2022, p. B.1). In its article on market developments, the *New York Times* also placed somewhat more emphasis than the *Journal* on interest rate increases abroad, mentioning prominently that "central banks around the world hiked interest rates to fight inflation"; but it also reported, "Wall Street is worried that the Fed may be pumping the brakes too hard on an already slowing economy, which makes steering into a recession more likely. On Wednesday, Fed Chair Jerome Powell stressed his resolve to lift rates high enough to drive inflation back toward the central bank's 2 percent goal" (9/23/2022, p. B.2). The reason this date is in our broad sample but not our narrow one is that there was no clear news about monetary policy on 9/22—the main public events the articles referred to occurred before markets closed on 9/21. Nonetheless, the *Journal* and the *Times* attributed the rise in nominal rates largely to market participants reassessing the Federal Reserve's commitment to disinflation.

9/15/2022 (9-point increase). The *Wall Street Journal*'s article on market developments was headlined, "Major Indexes Fall As Traders Expect An Aggressive Fed," and quoted an analyst as saying, "It looks like central banks certainly have got religion in terms of their inflation-busting mandate and they're unlikely to swing that to stabilizing economic growth" (9/16/2022, p. B.11). The *New York Times* article on market developments featured monetary policy less prominently, saying, "High prices and the Federal Reserve's aggressive plan to raise interest rates as a solution remain Wall Street's main focus. Investors also worry the Fed's rate hikes will tip the economy into a recession that could hurt company earnings" (9/16/2022, p. B.2). But another *Times* article pointed to a reassessment of the Federal Reserve's commitment, reporting, for example, "Federal Reserve officials are laser-focused on job gains and wage growth as they quickly raise interest rates to constrain the economy and slow rapid price increases. Officials are convinced that they must sap the economy of some of its momentum to wrestle the worst inflation in four decades back down to their goal of 2%" (9/15/2022 [no page number]).

10/6/2022 (8-point increase). The *New York Times* article on market developments did not describe any new information about monetary policy, but did refer to the Federal Reserve's "bid to crush inflation" (10/7/2022, p. B.2). Another article in the *Times* was headlined, "Global Fallout From Rate Moves Won't Stop the Fed" (10/6/2022 [no page number]). And another quoted statements on 10/6 from multiple FOMC members, including a report that "Christopher Waller, a Fed governor, said on Thursday [10/6] that inflation had not shaped up the way he would want 'to support a slower pace of rate hikes' than the Fed had previously projected, and argued that a few more data points were unlikely to change his mind" (10/7/2022, p. B.3). The *Wall Street Journal* article on market developments, like the *Times*' market-developments article, did not cite any news about monetary policy (other than a passing mention of "hawkish comments by Fed officials"), but had the subheadline, "Markets seesaw this week as traders seek to read Fed's reaction to economic indicators." The only significant news it reported was that initial claims for unemployment insurance were slightly higher than expected, which would work in the direction of lowering interest rates rather than raising them (10/7/2022, p. B.11). A brief news item the same day had the headline, "Cook Stresses Need To Keep Raising Rates," and reported comments from two Federal Reserve Governors suggestive of commitment to reduce inflation: "The Fed will need to keep rates at restrictive levels 'until we are confident that inflation is firmly on the path toward our 2% goal,' said Fed governor Lisa Cook," and, "Fed governor Christopher Waller, speaking separately at the University of Kentucky, said he still expects Fed officials to raise rates into early next year, even amid signs of progress on inflation" (10/7/2022, p. A.4).

Days Excluded from Both Samples. The remaining 31 days in our sample period when the nominal 2-year rate rose by 8 or more basis points do not satisfy our criteria.

A substantial number of the increases in the 2-year rate were attributed to data releases pointing to either higher inflation or stronger growth, and thus to tighter monetary policy to achieve a given objective. For example, the *New York Times* article on market developments on 2/10/2022, when the 2-year rate rose by 25 basis points, began, "Stocks slid and government bond yields jumped on Thursday after a key measure of inflation showed that consumer prices in the United States rose faster than expected in January, prompting investors to raise their bets on how quickly the Federal Reserve would tighten monetary policy" (2/11/2022, p. B.2). Other days when increases in the 2-year rate were attributed to data releases were 11/10/2021, 2/4/2022, 4/1/2022, 5/17/2022, 6/1/2022, 6/10/2022, 7/8/2022, 7/13/2022, 7/19/2022, 8/5/2022, 9/13/2022, and 10/13/2022. In almost all these cases, we rule out the dates based just on the information in the *New York Times* article on market developments.

The other large group of days with substantial increases in the 2-year rate that do not meet our criteria are ones where news reports do not describe any clear news about either the economy or about monetary policymakers' commitment, and thus give no clear reason for the increase. For example, the *New York Times* article on market developments on 10/19/2022, when the 2-year rate rose by 12 basis points, reported that "Treasury yields climbed to multiyear highs" but did not cite any reason; it went on to mention various small items of news that might have contributed to movements in stock prices (for example, "a mix of quarterly reports from several companies," "a report showing that construction on new homes declined more than expected in September," and "U.S. crude oil prices rose"), but no news about monetary policy (10/20/2022, p. B.2). The *Wall Street Journal*'s article on market developments said that "anxiety about inflation and the Federal Reserve's response continued to preoccupy investors," but did not come close to describing any news about monetary policy; and the *Journal*, like the *New York Times*, mentioned various small pieces of other news (10/20/2022, p. B.11).

Other days with no clear news are 1/14/2022, 3/14/2022, 3/25/2022, 4/14/2022, 4/19/2022, 9/6/2022, 9/9/2022, 9/19/2022, 9/23/2022, 9/29/2022, 10/19/2022, 10/28/2022, and 10/31/2022. The reports for a few of these days include some information about economic developments, though not ones that are cited as sources of the interest-rate increases, and some include allusions to monetary policy, but nothing remotely approaching news about the Federal Reserve's commitment to disinflation.

Of the remaining five days, three involve both news about Federal Reserve commitment and news about other developments that were viewed as important to the behavior of interest rates. The articles about market developments on 8/2/2022, when the 2-year rate rose by 16 basis points, cited news related to Federal Reserve commitment to disinflation and news related the visit of the Speaker of the House to Taiwan, which had led to "flight to safety" effects that were somewhat reversed on 8/2. For example, the *New York Times* article on market developments said, "Treasury yields climbed through the day as concerns calmed a bit that the first visit by a

U.S. Speaker of the House to Taiwan in 25 years could spark conflict between the world's two largest economies. Analysts also cited comments by Federal Reserve officials that suggested continued hikes to interest rates are coming in order to knock down inflation" (8/3/2022, p. B.2). The *New York Times* article on market developments on 2/22/2022, when the 2-year rate rose by 9 basis points, included, "as the Federal Reserve prepares to pull back support for the economy amid high inflation," and, "Fed officials have indicated that they are preparing to raise interest rates, currently near zero" (2/23/2022, p. B.1). Another *Times* article was headlined, "Fed Is Poised to Cut Economic Help Swiftly Despite Russian Tensions" (2/22/2022 [no page number]). But the *Wall Street Journal* article on market developments focused almost entirely on various developments related to Ukraine, and made no mention of monetary policy (2/23/2022, p. A.1). Finally, the *Wall Street Journal* article on market developments on 2/14/2022, when the 2-year rate rose by 8 basis points, reported, "Yields on government bonds were whipsawed by the fast-moving situation. After initially falling as investors reached for the safety of U.S. Treasurys, they bounced back on [Russian Foreign Minister] Lavrov's comments and climbed further on comments from hawkish Fed officials about the pace of interest-rate increases" (2/15/2022, p. B.1).

The final days with large increases in the nominal 2-year rate, 3/2/2022 and 3/8/2022 are more idiosyncratic. The articles in both the *New York Times* and the *Wall Street Journal* about market developments on 3/2, when the 2-year rate rose by 19 basis points, cited news about the Federal Reserve, but news at best only slightly related to greater commitment—indeed, arguably the news pointed to lower interest rates going forward than had been expected. All that the *Wall Street Journal* article said about monetary policy was, "investors parsed testimony on the Federal Reserve's plans to raise interest rates," and, "Fed Chairman Jerome Powell, appearing before the House Committee on Financial Services, said he would propose a quarter-percentage-point rate increase at the central bank's meeting in two weeks. That alleviated concerns on Wall Street that the central bank would raise rates by half a percentage point" (3/3/2022, p. B.1). Similarly, the *New York Times* article on market developments reported, "Federal Reserve Chair Jerome H. Powell said he supports a more modest rise in interest rates this month than some investors had feared," and, "Mr. Powell's comments helped drive the market higher" (3/3/2022, p. B.2). The articles about Powell's testimony painted a somewhat more nuanced picture. For example, the *Journal* reported that "he laid the groundwork for the possibility of half-point increases this summer. … 'This is strong, high inflation, and it's very important that we get on top of it, and that's exactly what we're going to do,' Mr. Powell told lawmakers" (3/3/2022, p. A.1). But the fact that the summaries of the testimony in analyses of market developments did not refer to new indications of Federal Reserve commitment mean that this date does not satisfy our criteria.

The other remaining day, 3/8/2022, when the 2-year rate rose by 8 basis points, falls in between the cases where there was news unrelated to monetary policymakers' commitment and no clear news. The *New York Times* article on market developments did not mention interest rates or the Federal Reserve at all (3/9/2022, p. B.2). The *Wall Street Journal* article on market developments also did not mention these topics, but viewed a range of developments related to Ukraine as driving changes in stock and bond prices (3/9/2022, p. B.1).

References

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