Quantifying the Costs and Benefits of Quantitative Easing

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27 July 2022

These remarks solely reflect the views of the authors and should not be interpreted as reflecting the views of any other person or institution.

Breaking News

"New Zealand's Treasury Department has begun payments to the Resereve Bank to offset losses on bonds the bank bought during its QE program in 2020-21…As interest rates have increased, the public liability has climbed to NZ$9 billion …Under the terms of the indemnity, the Treasury is required to make payments to offset the RBNZ's declining net interest income [and] its losses on bond sales."

Bloomberg News, 25 July 2022

Introduction

- **During QE3, policymakers acknowledged uncertainties about the costs and benefits of large-scale purchases of Treasuries and MBS:**

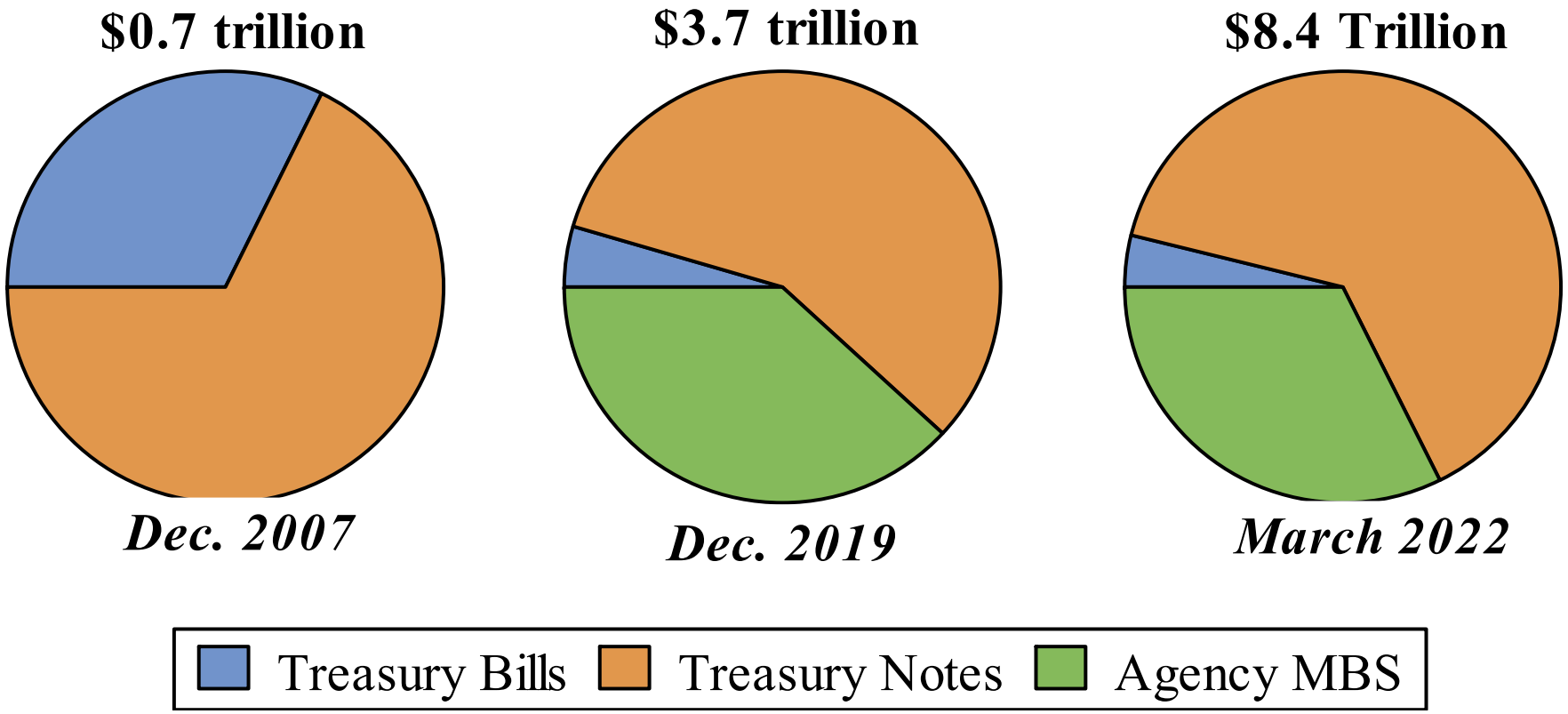
  In determining the size, pace, and composition of its asset purchases, the Committee will, as always, take appropriate account of the likely efficacy and costs of such purchases."

  FOMC Statement, September 2012

- **In contrast, during 2020-21 the Fed deployed QE far more aggressively, as though its efficacy was assured and its costs were trivial.**

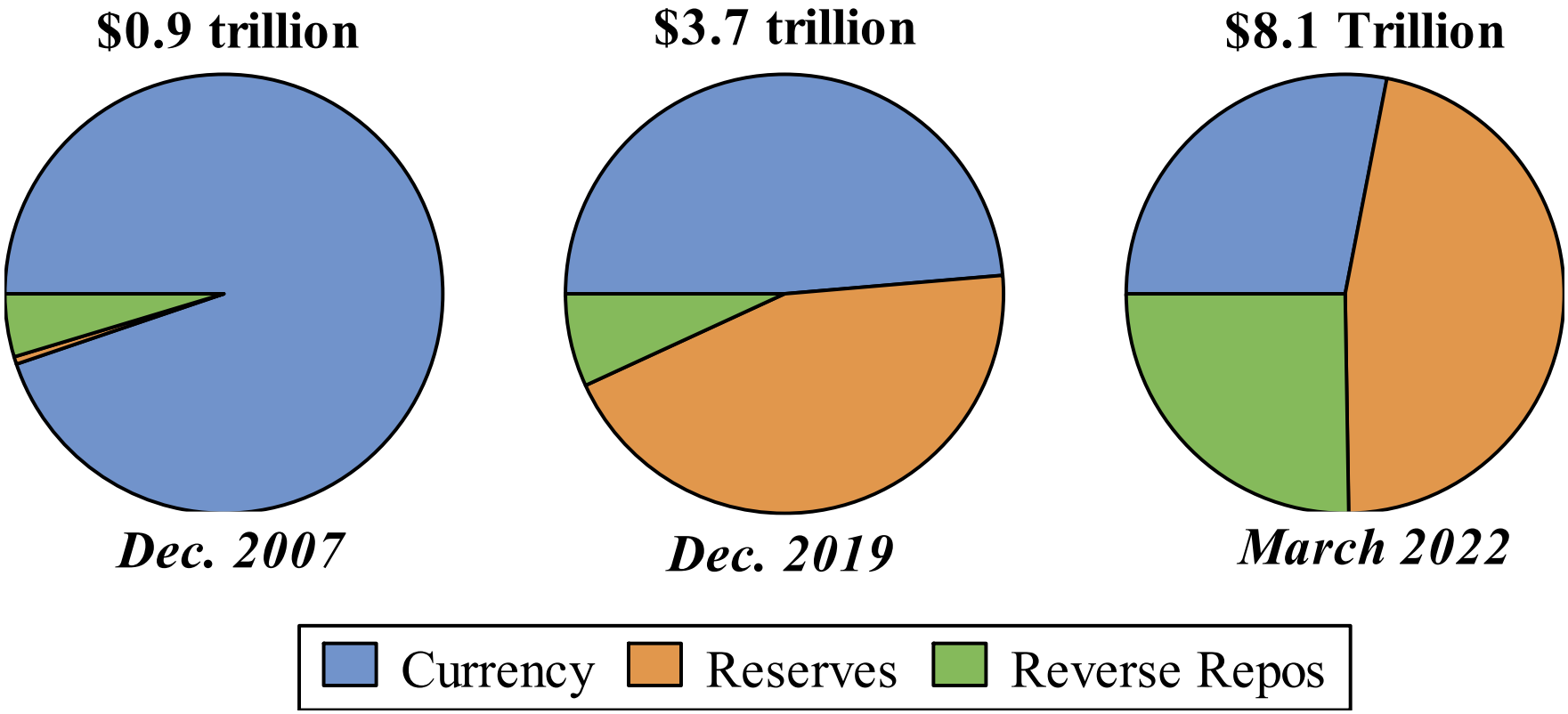
- **Our paper engages in systematic analysis of the costs and benefits of QE4.**

Federal Reserve Assets



- **Fed balance sheet has grown by 10x**
- **Duration of SOMA assets has increased**

Federal Reserve Liabilities



- **Interest-Bearing Liabilities = 75% of SOMA**
- **Fed is borrowing short and lending long, analogous to a "carry trade" with no hedges.**

Our Methodology

- We analyze the entire SOMA portfolio using individual CUSIP-level information on coupon, maturity, purchase date, and current holdings.
- We use data from Bloomberg and Refinitiv to estimate the purchase price of each security as well as the latest projection of MBS cashflows.
- We construct a baseline projection of the Fed's balance sheet that follows the reinvestment plan announced by the FOMC in May 2022.
- We construct a counterfactual projection in which the Fed did not engage in QE4.

Key Findings

- **Program Design: The evolution of QE4 was opaque, improvised, and inertial.**
- **Market Functioning: QE4 markedly expanded the Fed's footprint in markets for Treasuries & MBS, with potentially adverse consequences for the functioning of these markets over time.**
- **Balance Sheet Normalization: Total size will be normalized by late 2024, but the composition of asset holdings will remain far from normal.**

Key Findings *(contd.)*

- **Interest Rate Risk: By purchasing longer-term securities by creating short-term liabilities, the FOMC incurred substantial interest rate risk.**
- **Cost to Taxpayers: In our baseline projection, the Fed's remittances to the Treasury will be about $550 billion less than in the No-QE4 counterfactual; the cost could exceed $1 trillion if the Fed follows the rate path prescribed by the Taylor Rule and other simple benchmarks.**

Outline

1) The Evolving Rationale for QE4
2) Detailed Analysis of Treasuries Purchases
3) Detailed Analysis of Agency MBS Purchases
4) Baseline vs. Counterfactual Simulations
5) Assessing the Benefits of QE4

Fed Policy in March 2020

During early March, the Fed cut rates and performed its role as lender of last resort by launching emergency credit facilities, including unlimited liquidity in the repo market.

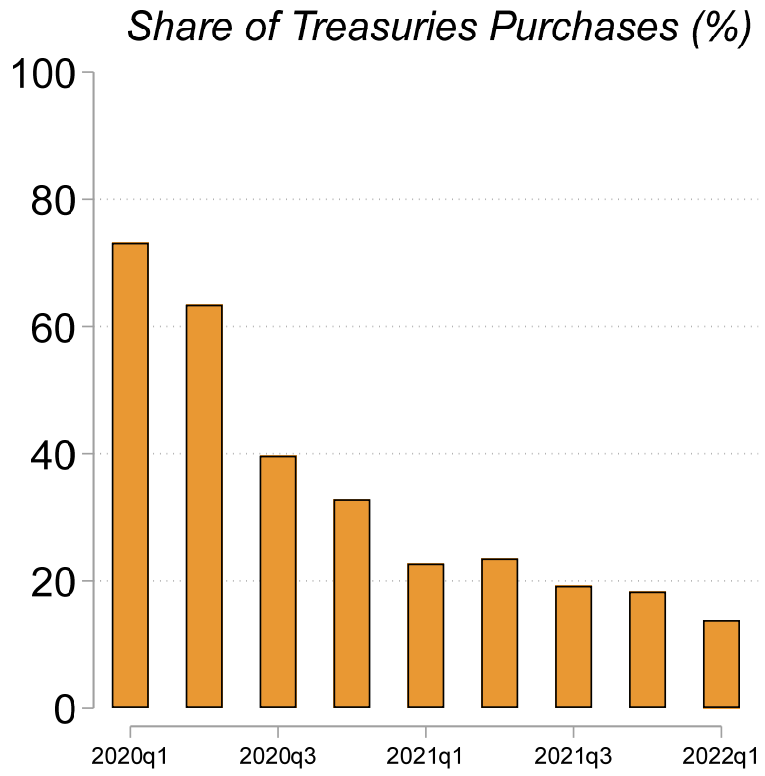
On March 16, the Federal Reserve undertook a new role as market-maker of last resort:

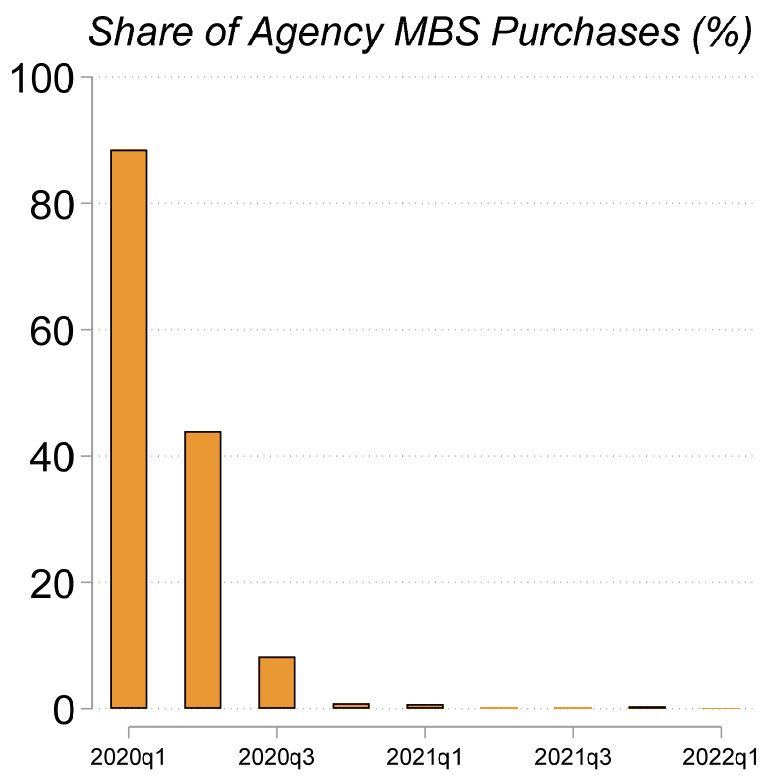
"To support the smooth functioning of markets for Treasury securities and agency MBS… the Committee will increase its holdings of Treasuries by at least $500 billion and its holdings of agency MBS by at least $200 billion."

One week later the FOMC removed those limits and simply referred to purchases *"in the amounts needed."*

QE4 Purchases of Seasoned Securities

(Treasuries issued prior to 2019, agency MBS issued prior to 2020)





- **From June 2020 onwards, nearly all QE4 purchases were recently-issued securities.**

FOMC Statements in 2020

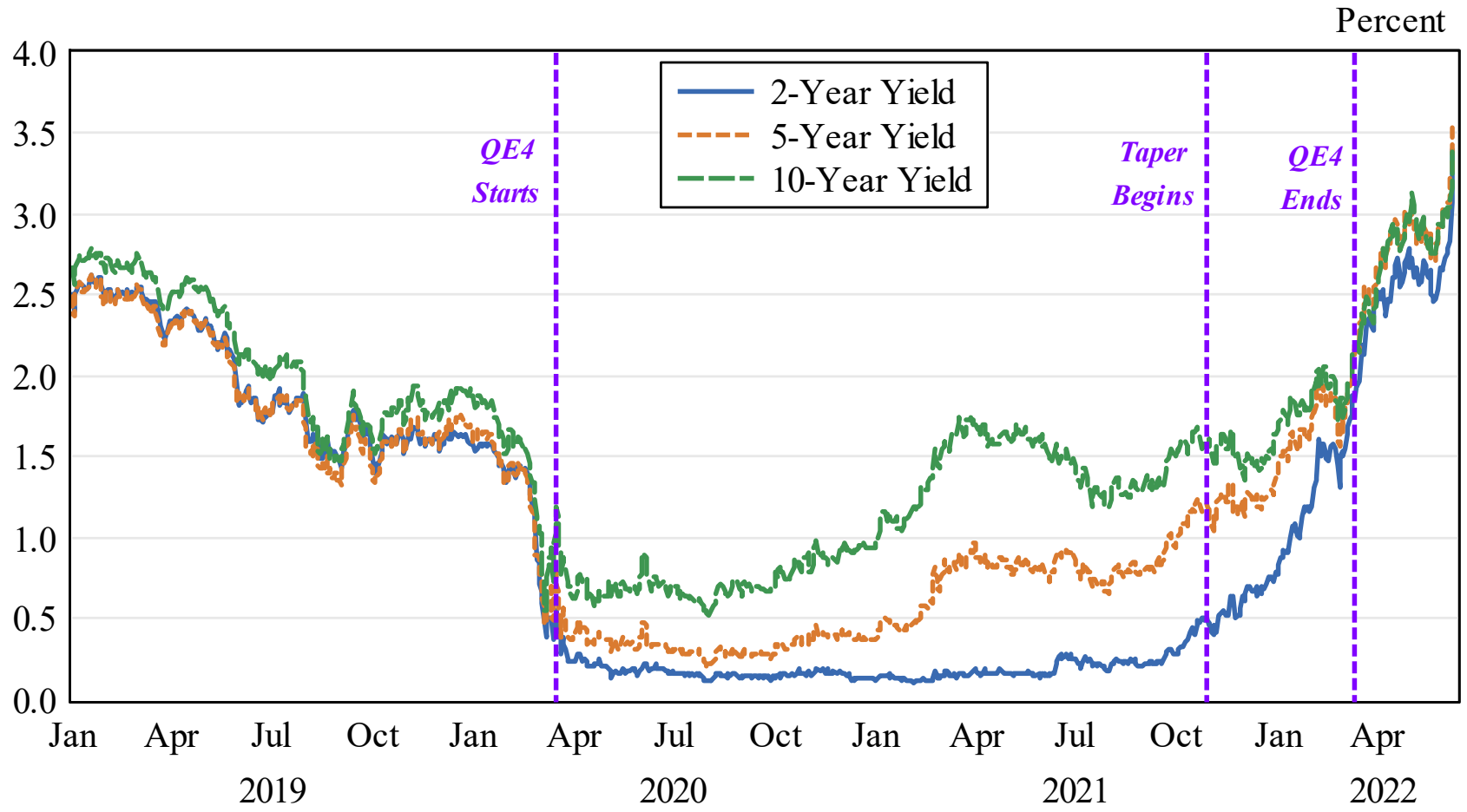
March 2020: ***"…the Committee will closely monitor market conditions and…assess the appropriate pace of its securities purchases at future meetings."***

April 2020: continue purchases "in the amounts needed to support smooth market functioning."

June to November 2020: continue purchases "at least at the current pace to sustain smooth market functioning."

December 2020: continue purchases to "help foster smooth market functioning and accommodative financial conditions" pending "substantial further progress" on maximum employment & price stability.

Treasury Yields during QE4



- QE4 did not reduce Treasury yields.
- Most QE4 purchases had extremely low yields.

FOMC Communications in 2021-22

Jan.-May 2021: "not even talking about talking about" tapering.

June 2021: "began talking about talking about" tapering.

July 2021: "…the economy has made progress."

Sept. 2021: "a moderation in the pace of asset purchases may soon be warranted."

Nov. 2021: taper starts, to be finished by spring.

Dec. 2021: taper accelerated, to be finished by March.

May 2022: FOMC initiates balance sheet shrinkage.

QE4 Purchases of Treasury Notes & Bonds

$ Billions

Dates	Total Purchases	Maturing Securities	Net Change in Holdings	Average Monthly Pace
March 18 to April 1, 2020	824	-17	808	1,615
April 2 to April 29, 2020	626	-1	626	626
April 30 to July 1, 2020	346	-104	242	121
July 2 to Sept. 30, 2020	370	-142	228	76
Oct. 1 to Dec. 31, 2020	333	-93	240	80
Jan. 1 to Oct. 31, 2021	1,407	-605	802	80
Nov. 1 to Dec. 31, 2021	260	-127	133	66
Jan. 1 to March 31, 2022	296	-196	101	34
Total	**4,462**	**-1,284**	**3,179**	**130**

QE4 Purchases of Agency Residential MBS

$ Billions

Dates	Total Purchases	Maturing Securities	Net Change in Holdings	Average Monthly Pace
March 18 to April 1, 2020	107	-23	85	169
April 2 to April 29, 2020	176	-35	141	141
April 30 to July 1, 2020	408	-103	305	153
July 2 to Sept. 30, 2020	278	-207	71	24
Oct. 1 to Dec. 31, 2020	292	-236	56	19
Jan. 1 to Oct. 31, 2021	1195	-706	489	49
Nov. 1 to Dec. 31, 2021	201	-113	88	44
Jan. 1 to March 31, 2022	230	-130	100	33
Total	***2,886***	***-1,552***	***1,335***	***54***

Detailed Analysis of Treasuries Purchases

- Market Functioning
- Maturity Structure
- Duration & Interest Rate Risk
- Consolidated Federal Government

QE & Market Functioning

- **In the early 2000s, the SOMA established a cap of 15% on its holdings of individual Treasuries with maturities of 10+ years, with caps up to 25% for shorter-term Treasuries.**
- **During QE3 policymakers were alert to these issues. For example, in 2013 the SOMA manager gave public remarks as follows:**

" The Committee...is aware of the potential for large-scale asset purchases to contribute to financial market dysfunction...If the Federal Reserve were to become too dominant a buyer or holder, it could reduce the tradable supply…and discourage trading, leading to diminished liquidity and price discovery [which] could lead investors to demand a premium for transacting in these markets, ultimately raising borrowing costs and undermining the program's policy goal."

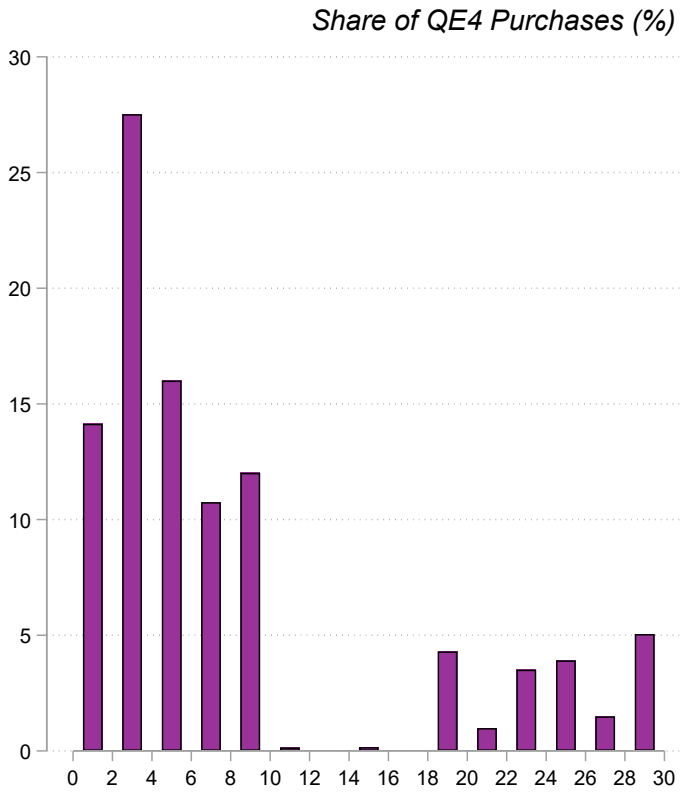
The Fed's Footprint in the Market for Treasury Notes and Bonds

	SOMA Holdings		CUSIP-Level Ratio to Total Issuance (%)	
Date	*Par Value ($ billions)*	*Share of Total Outstanding (%)*	*Median Security*	*95th Percentile*
December 2007	494	14.3	15.2	24.2
February 2020	2,135	15.6	9.5	62.3
March 2022	5,292	**28.6**	**25.1**	**65.9**

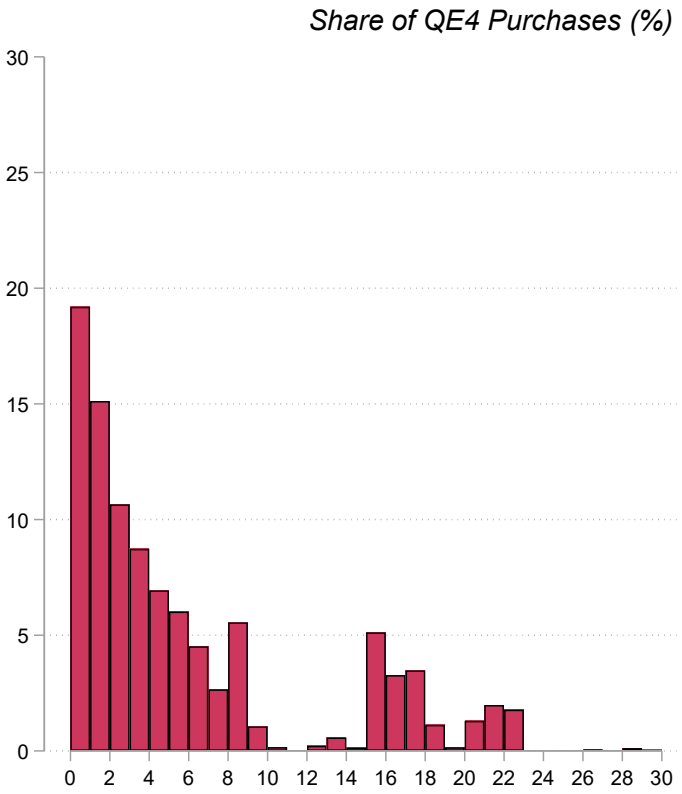
- **The SOMA now holds nearly 30% of all outstanding Treasury notes & bonds.**
- **Its holdings systematically exceed the caps that were designed to avoid causing market dysfunction.**

Characteristics of the Treasuries Purchased during QE4

Term to Maturity



Duration



- These distributions are bimodal, reflecting "primary dealer of last resort" transactions.

Duration and Interest Rate Risk

- **The Treasury securities purchased during QE4 have a par value of $3.8 trillion and a mean duration of about 6 years.**
- **Consequently, a 1.5% upward shift in the level of interest rates (like the rise since Oct. 2021) has reduced the market value of these securities by about $350 billion.**
- **This amount is an approximation of the present discounted value of the shortfall in net interest income and is well aligned with the analysis of Nelson (2021, 2022). (Email *bill.nelson@bpi.com*)**

QE4 and the Liabilities of the Consolidated Federal Government

	Marketable Treasury Securities		Interest-Bearing Liabilities of Consolidated Fed. Govt.	
Date	*Par Value ($ trillions)*	*Avg. Maturity (years)*	*Par Value ($ trillions)*	*Avg. Maturity (years)*
December 2007	4.3	4.6	3.5	4.7
February 2020	16.1	5.9	14.1	4.9
March 2022	22.5	**6.2**	20.0	**4.0**

- **During 2020-21, the Treasury Department was seeking to "lock in" low rates on its debt, but QE4 essentially canceled that out.**

Detailed Analysis of Agency MBS Purchases

- Market Functioning
- Maturity Structure
- Prepayment Rates
- Duration & Interest Rate Risk

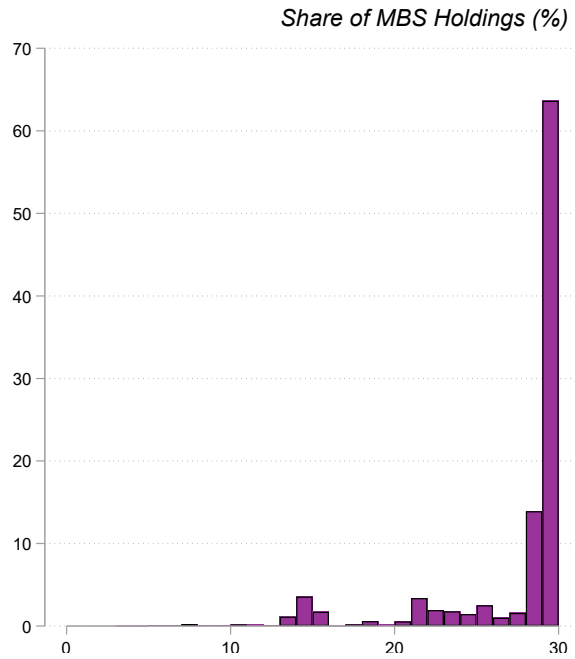
The Fed's Footprint in the Market for Agency Residential MBS

	SOMA Holdings		CUSIP-Level Ratio to Total Issuance (%)	
Date	*Face Value ($ billions)*	*Share of Total Outstanding (%)*	*Median Security*	*75th Percentile*
December 2007	0	0	0	0
December 2019	1,409	28	100	100
March 2022	2,715	**42**	**74**	**92**

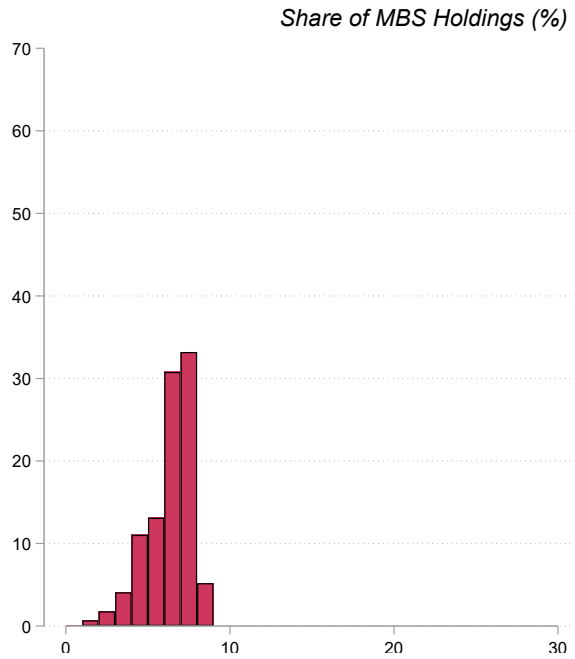
- The SOMA now holds nearly half of the total stock of agency residential MBS.
- The SOMA now holds most of the outstanding amount of most of the securities in this market.

Characteristics of the Agency MBS Purchased during QE4

Term to Maturity



Duration



- The bulk of QE4 purchases were agency MBS backed by 30-year fixed-rate mortgage pools.
- The effective maturity and duration of these securities are affected by mortgage prepayments.

Salient Characteristics of Agency Residential MBS

- **Residential MBS are a "pass-through" security, with monthly payments of principal & interest (unlike Treasuries that pay principal at maturity).**
- **The flow of principal payments includes scheduled payments and prepayments.**
- **The incidence of prepayments mainly reflects refinancing of existing mortgages, which varies due to changes in prevailing mortgage rates.**

"Use caution when investing in MBS…Investors who draw comfort from a dependable and consistent semiannual payment may find the unpredictability of MBS unsettling."

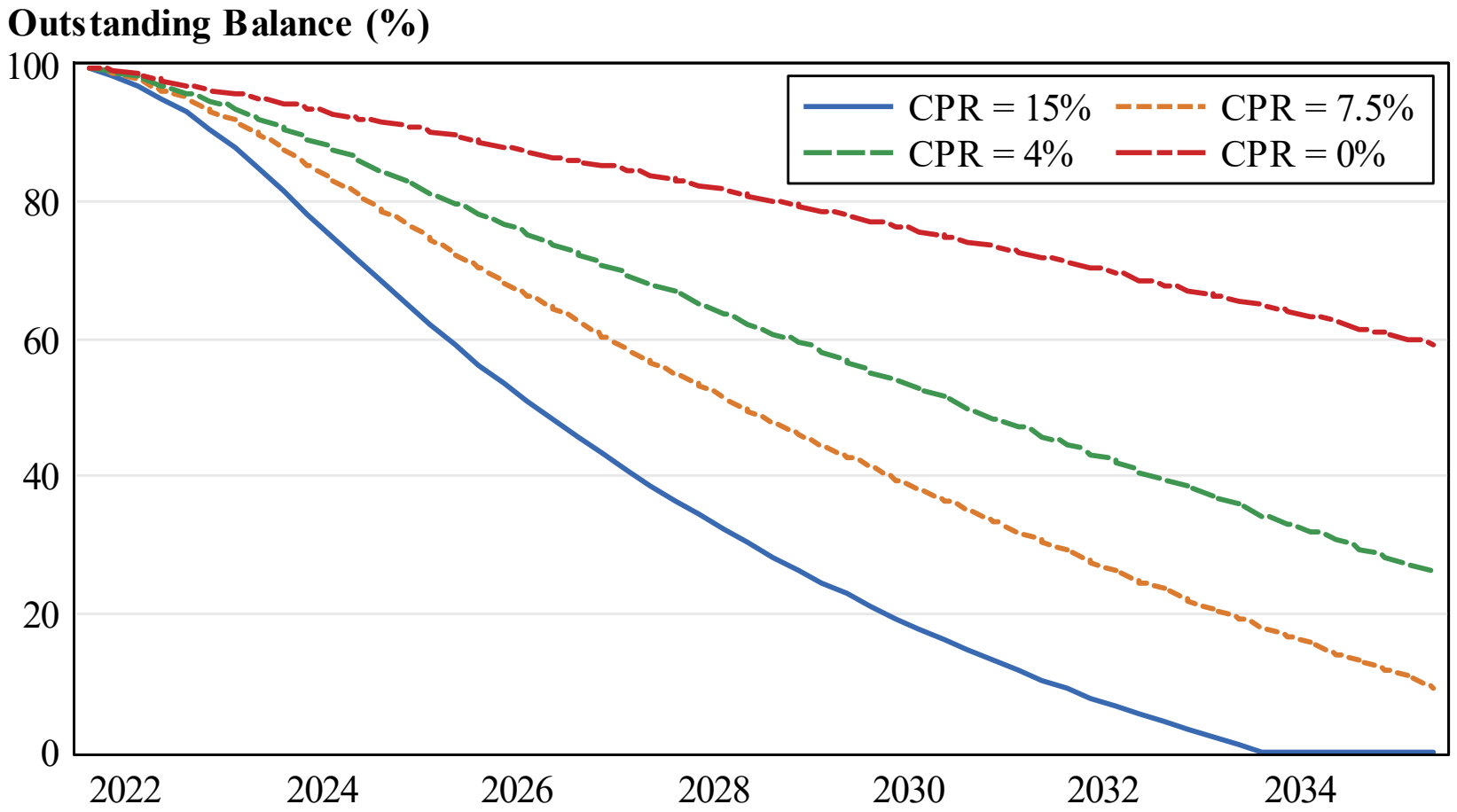
FINRA Factsheet

Prepayment Rates and Duration of SOMA Holdings of Agency MBS

Assessment Date	Projected Level of Prepayment Rate (%)		Projected Duration (years)
Nov. 14, 2021	14.6		4.5
May 12, 2022	7.3		6.6
Ratio	0.5		1.4

Sources: Bloomberg (cash flow & CPR projections), Federal Reserve Bank of New York (SOMA holdings), authors' calculations.

Prepayments and the Evolution of Agency Residential MBS Holdings



Liquidity of SOMA Holdings of Agency MBS at the End of QE4

- About one-fourth of agency MBS holdings have liquidity comparable to U.S. Treasuries, but the bulk of its securities are notably less liquid.
- This pattern underscores the potential difficulties of initiating active sales of agency MBS.

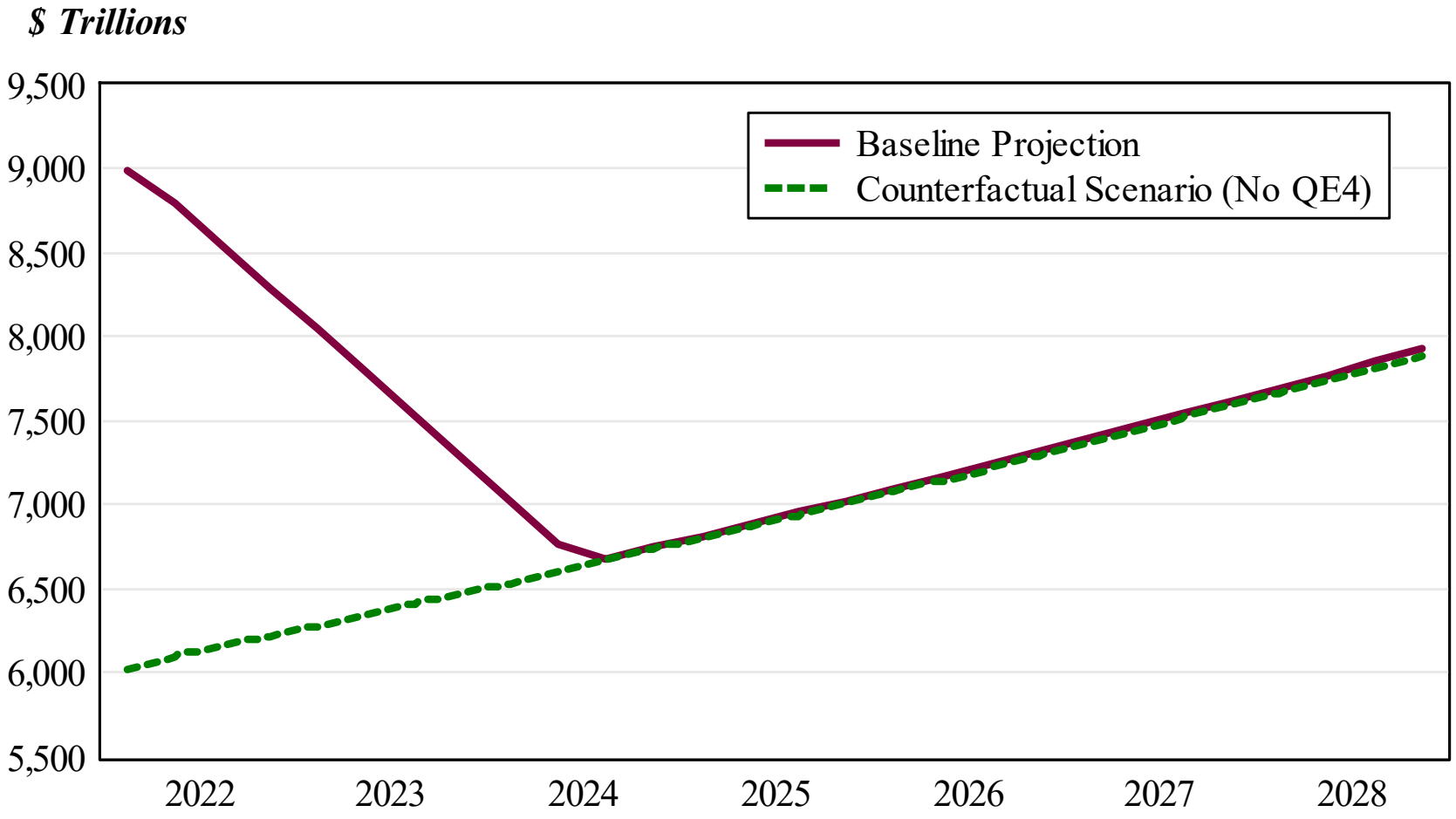
Balance Sheet Simulations

- We use individual CUSIP-level information about the SOMA portfolio, combined with Bloomberg cash flow projections for agency MBS, and we use the path of interest rates consistent with current forward rates.
- We construct a baseline projection that follows the reinvestment plan announced by the FOMC in May 2022.
- We construct a counterfactual projection in which the Fed did not engage in QE4.

The Baseline Path of SOMA Assets & Liabilities

- **Total assets will decline from $9 trillion to about $6.7 trillion by 2024:Q4.**
- **Holdings of Treasury notes & bonds will decline by nearly $60 billion per month, accompanied by slight declines in holdings of Treasury bills.**
- **Holdings of agency MBS will only decline by about $20 billon per month.**
- **The Fed's liabilities of bank reserves and reverse repos will decline in parallel to about $1.8 trillion and $1.2 trillion, respectively.**

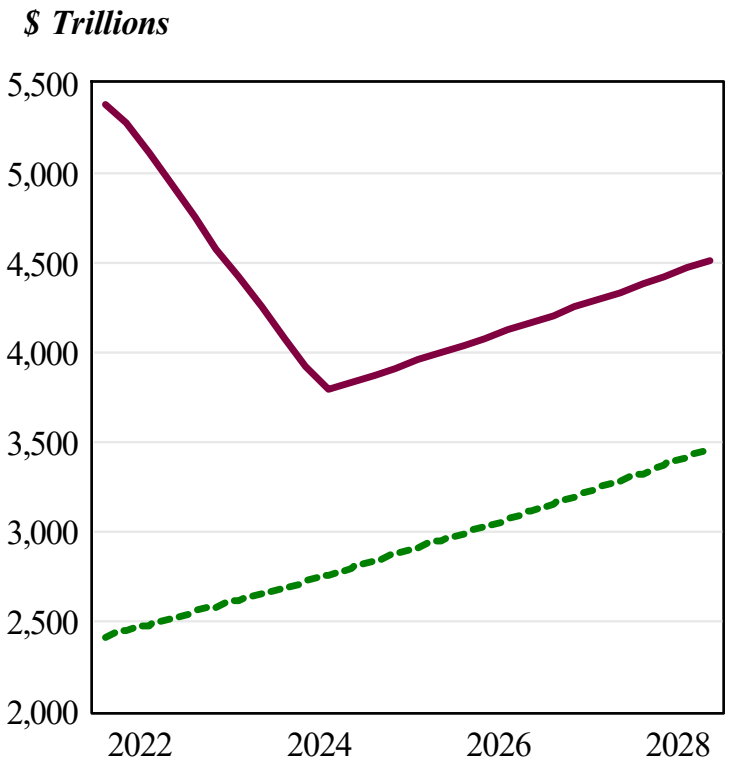
Total Assets



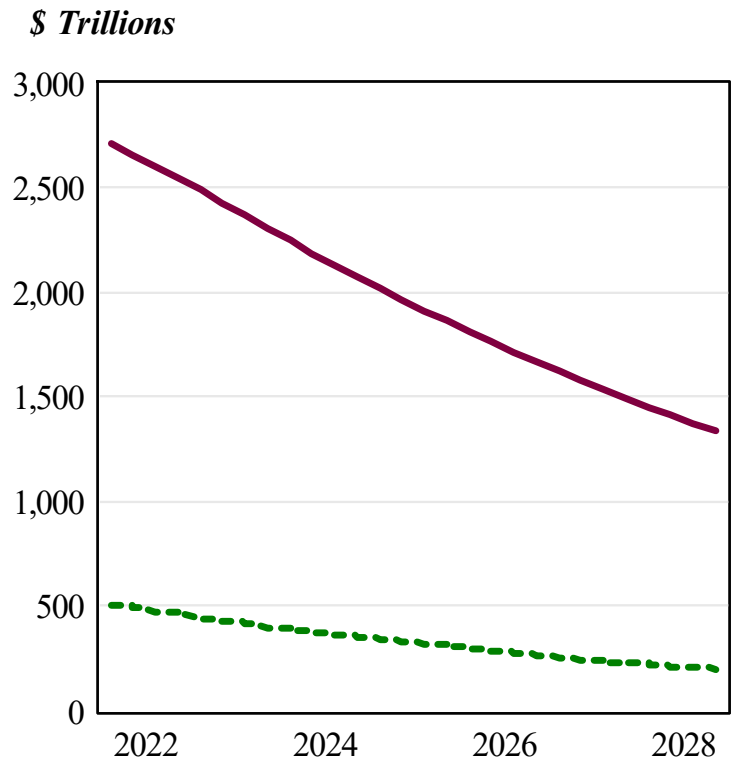
- **The overall size of the Fed's balance sheet can be "normalized" by around 2025.**

Composition of Assets

Treasury Notes and Bonds

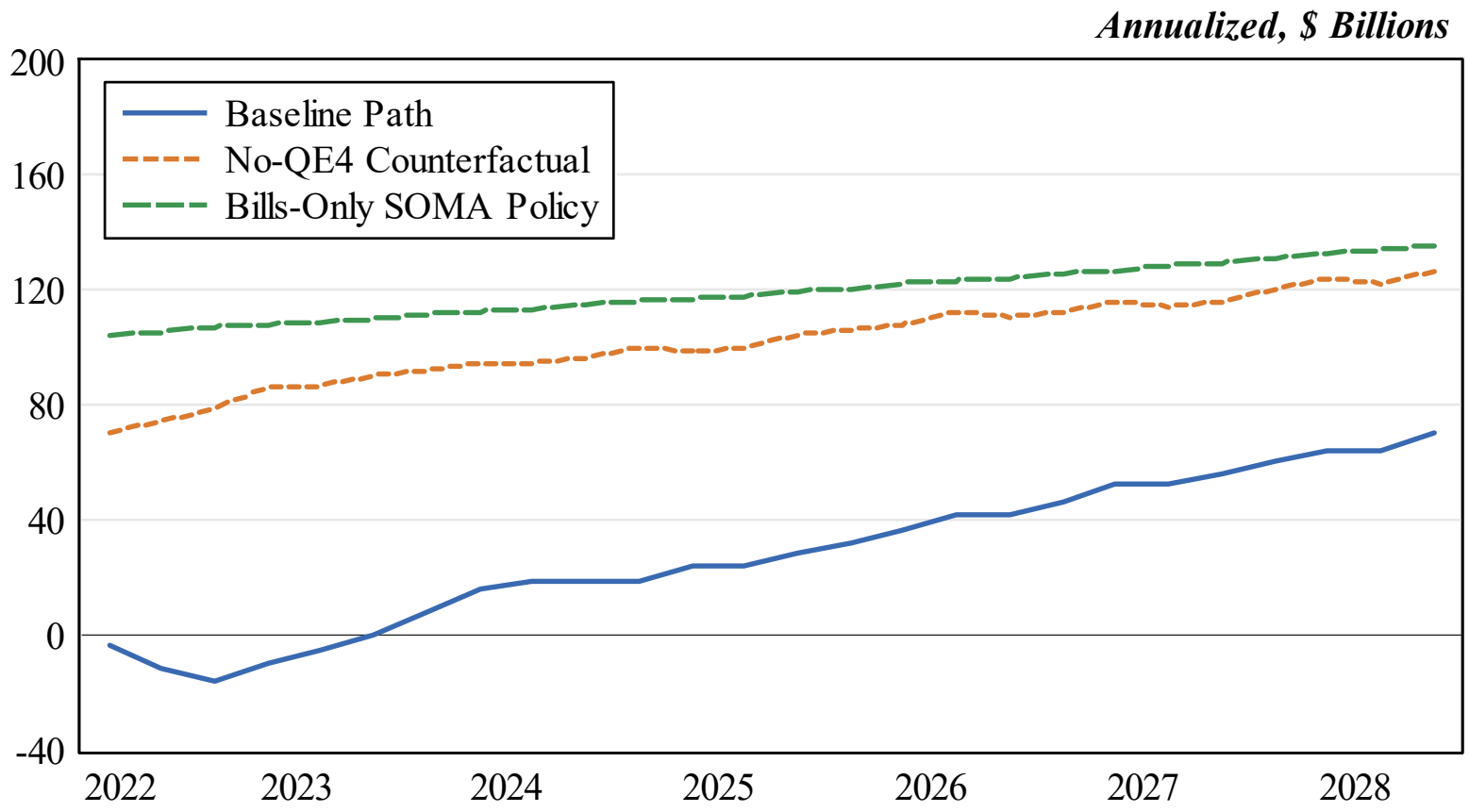


Mortgage-Backed Securities



- **Rolloffs won't be sufficient for rapid "normalization."**
- **Most seasoned MBS are *illiquid* and *not easily sold*.**

The Net Interest Cost of QE4



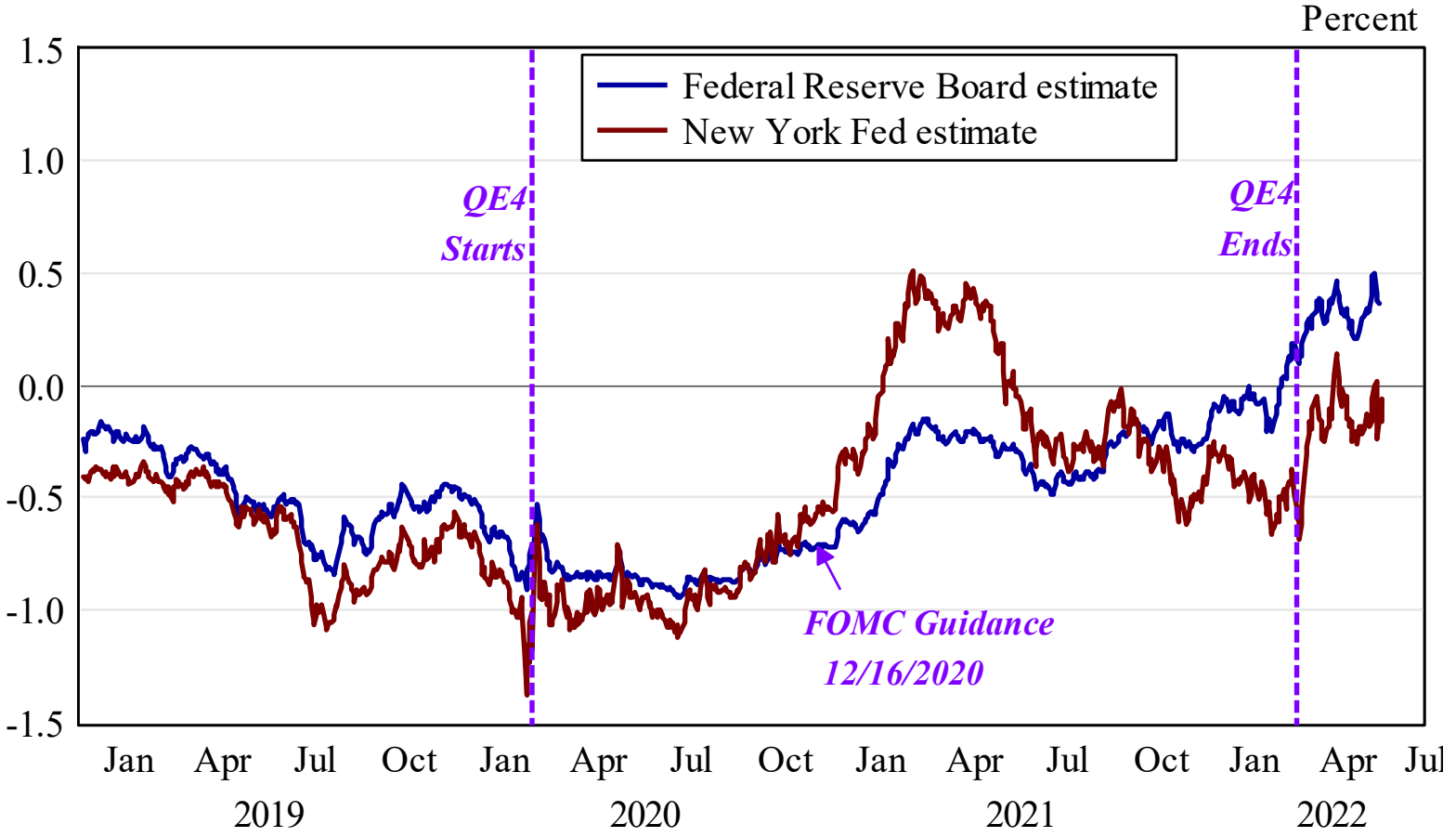
- **QE4 will sharply reduce net interest income and hence remittances to the U.S. Treasury.**
- **The total cost is likely to be at least $500 billion, and that cost will be borne by U.S. taxpayers.**

Potential Benefits of QE4

- **Macroeconomic Benefits:** such purchases "put downward pressure on longer-term interest rates" *(FOMC, 2012)*
- **Federal Budget Deficits**: such purchases could boost tax receipts and reduce transfers and interest expense on the debt.
- **Market Functioning:**
  - The Fed bought over $1 trillion in Treasuries during March and early April 2020.
  - This intervention was effective but not costless, boosting the rationale for market reforms.

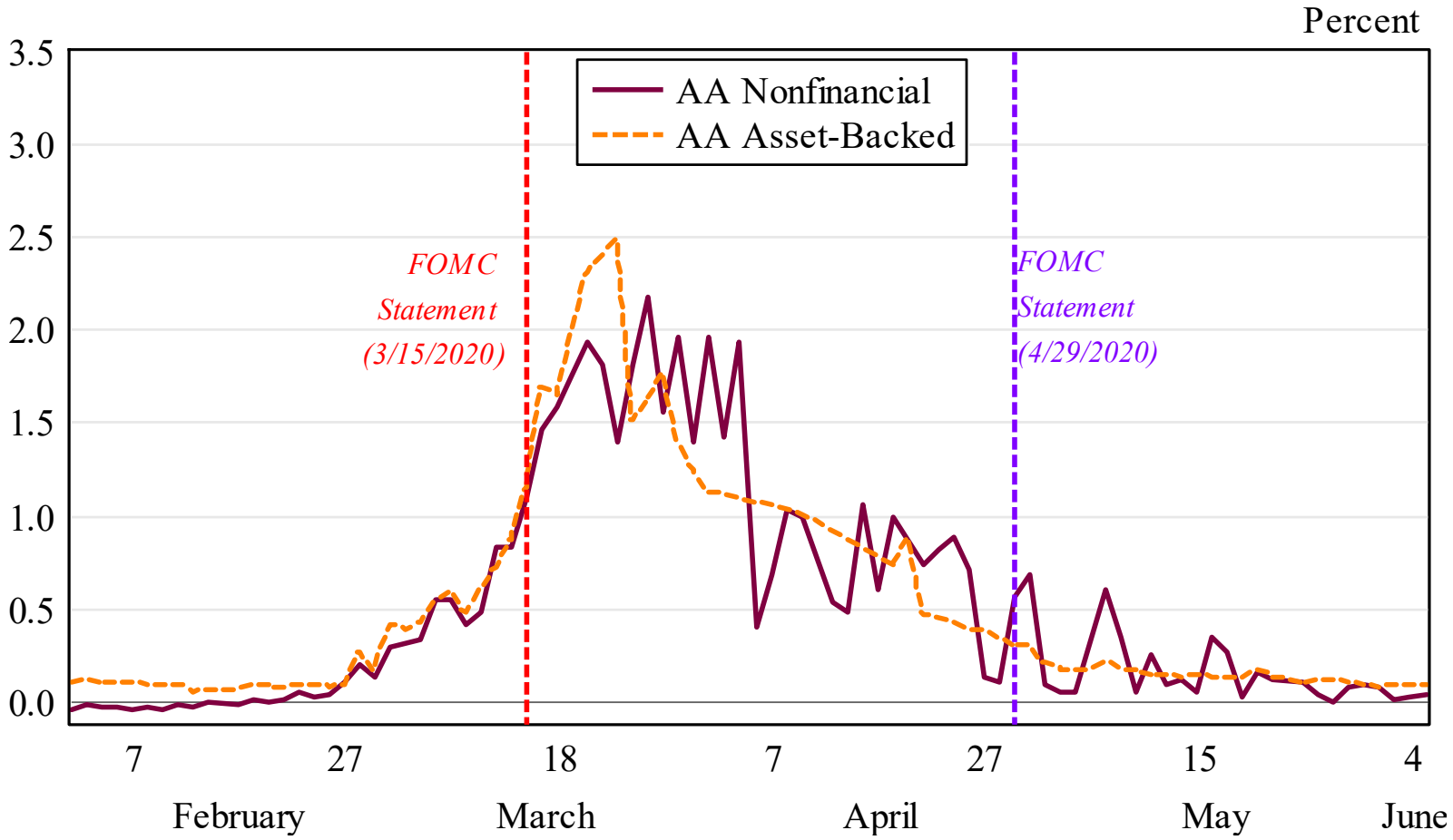
Term Premium Estimates during QE4

(10-year constant maturity Treasury note)



- These estimates suggest that QE4 did not reduce the term premium significantly.
- The Dec. 2020 guidance caused a tantrum.

Spreads between Commercial Paper and Treasury Bills in 2020:H1



- **Financial strains intensified in early March and subsided by mid-to-late April 2020.**

Potential Implications of our Findings

- The Fed could disclose information and staff analysis of QE4 as well as data on the prices paid for individual securities purchases.
- Congress could specifically direct the GAO to review all aspects of QE4, analogous to the review initiated by the Dodd-Frank Act.
- Congress could authorize GAO to conduct comprehensive reviews of the Federal Reserve. Such reviews could encompass the FOMC's policy framework and operations, but the GAO would refrain from commenting on FOMC decisions about the stance of monetary policy.

Potential Implications *(contd.)*

- **Congress could constrain the Fed's discretion in assuming large amounts of interest rate risk, analogous to the constraints on credit risk that were established by the Dodd-Frank Act.**
- **The US Treasury *(not the Fed)* could be assigned responsibility for all adjustments to the maturity composition of outstanding debt.**
- **Such steps could prove very helpful for sustaining the Fed's independence in determining the stance of monetary policy.**