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Fixed Income Research

Balance Sheet – Some long-term issues

US Economics

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See Appendix A-1 for analyst certification, important disclosures and the status of non-US analysts.

Any authors named on this report are research analysts unless otherwise indicated.

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Agenda

- ***Effectiveness of QE and the portfolio channel***
- ***The criteria for determining the ultimate size of the balance sheet:***
  - ***Efficiency and effectiveness of monetary policy***
  - ***Systemic risk***

The discussion draws heavily from L. Alexander, A. Amemyia, R. Dent, M. Doms, and K. Lee (2017), "Normalizing" the Fed's Balance Sheet, Nomura Policy Watch, August 31. Source: Nomura Economics

"The problem with QE is that it works in practice, but it doesn't work in theory."

Ben Bernanke, January 16, 2014.

- ***This <u>is</u> a problem.***

Source: James Saft, "You must be joking, Mr. Bernanke," Reuters, 16 January 2014 and Nomura Economics

A broad range of studies suggest that QE bond purchases were effective

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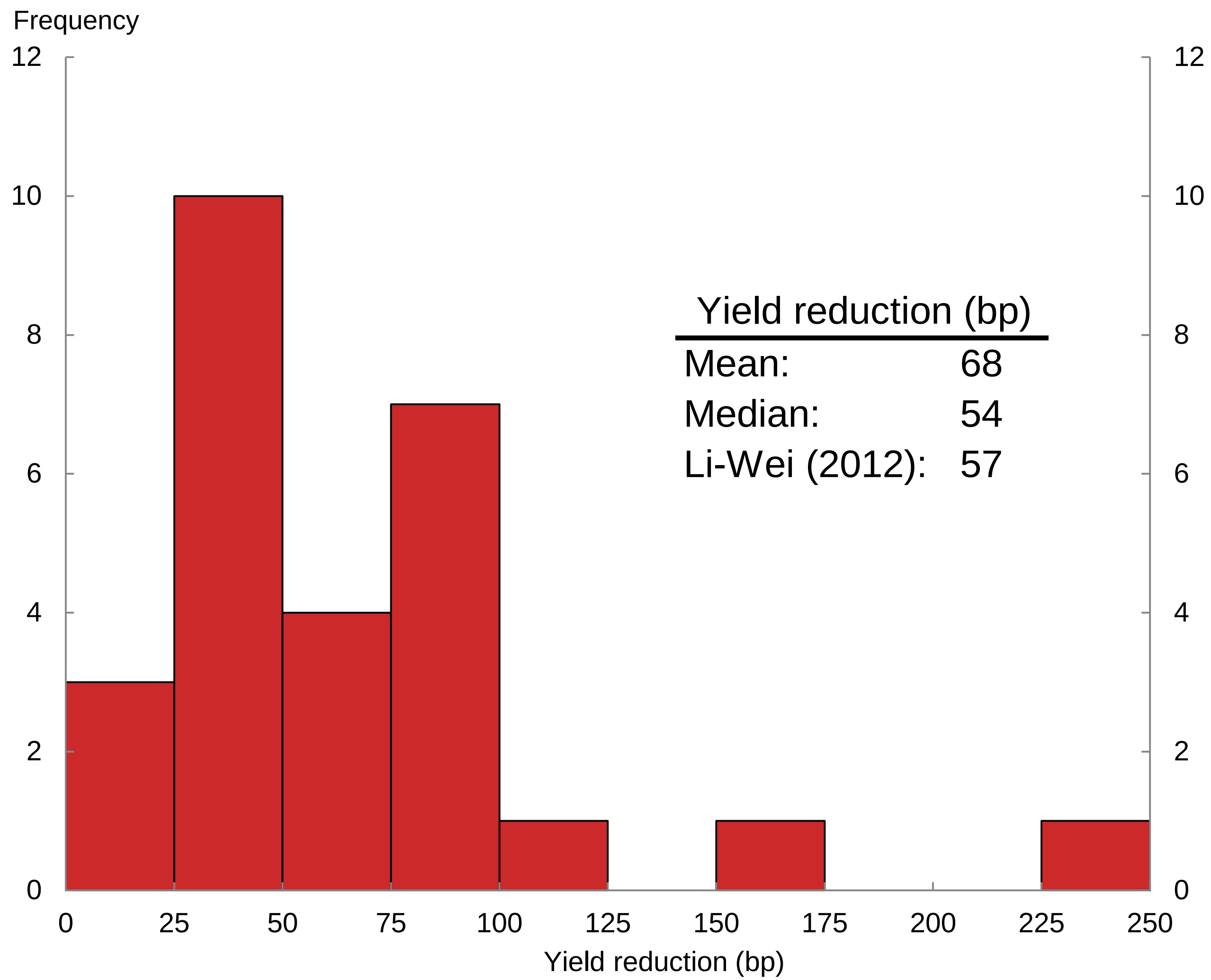
- Gagnon (2016) reports results from a range of empirical studies of the impact of asset purchases on long-term interest rates
  - 18 event studies
  - 6 time series
  - 3 structural models.
- The estimates are broadly consistent and suggest that such asset purchases are effective.

Distribution of the estimates of effects of QE bond purchases on 10-year yields



Source: Gagnon (2016) and Nomura Economics

Why does QE work?

- That standard view is that QE works through two channels
  - Signaling – forward guidance
  - Portfolio balance – supply of duration.
- There is more confidence in the signaling channel
  - It is closer to conventional understanding of how policy works.
- Skepticism about the portfolio balance/supply channel persists
  - Standard models, with representative agents, do not tend produce supply effects.
- This matters
  - The FOMC may not think about implications of its balance decisions
  - Doubts may make the FOMC reluctant to use QE in the future

Source: Nomura Economics

Modeling of the impact of supply

- Event studies
  - They are a useful as a way of identifying factors that are impactful
  - But full adjustment does not happen so fast.
- We need structural models.
- Not all investors are the same
  - To anyone involved in markets this basic fact seems obvious
  - Preferred habitat is a natural way to think about the impact of supply.
- One good approach -- affine models with different types of investors
  - Li-Wei model
  - Duration is what matters.

Source: Li and Wei (2014), Nomura Economics

Historical digression

- During and directly after WWII the Federal Reserve successfully controlled long-term interest rates, but this episode had essentially no impact on Federal Reserve thinking about monetary policy
  - Operation twist was a Treasury initiative which the Federal Reserve later disowned.
- Standard thinking was that all the Federal Reserve had to do was control short-term interest rates and possibly use forward guidance
  - This reflected high neutral rates
  - But it also reflected the theoretical judgment that the composition of the Fed's assets simply did not matter.
- The composition of the Federal Reserve's assets was dictated by other objectives
  - Facilitating interest rate control through the rapid and smooth adjustment of reserves
  - Promoting the efficiency of the Treasury market.

Source: Wallich and Keir (1979) and Meulendyke (1998), and d'Amico, et al (2012)

A practical problem

- ***When its time for the Federal Reserve's balance sheet to expand again, what type of assets will it buy?***
  - Treasury bills
  - Across the curve.
- ***If the portfolio/supply channel is important this question matters***

Source: Nomura Economics

Fed balance sheet "normalization"

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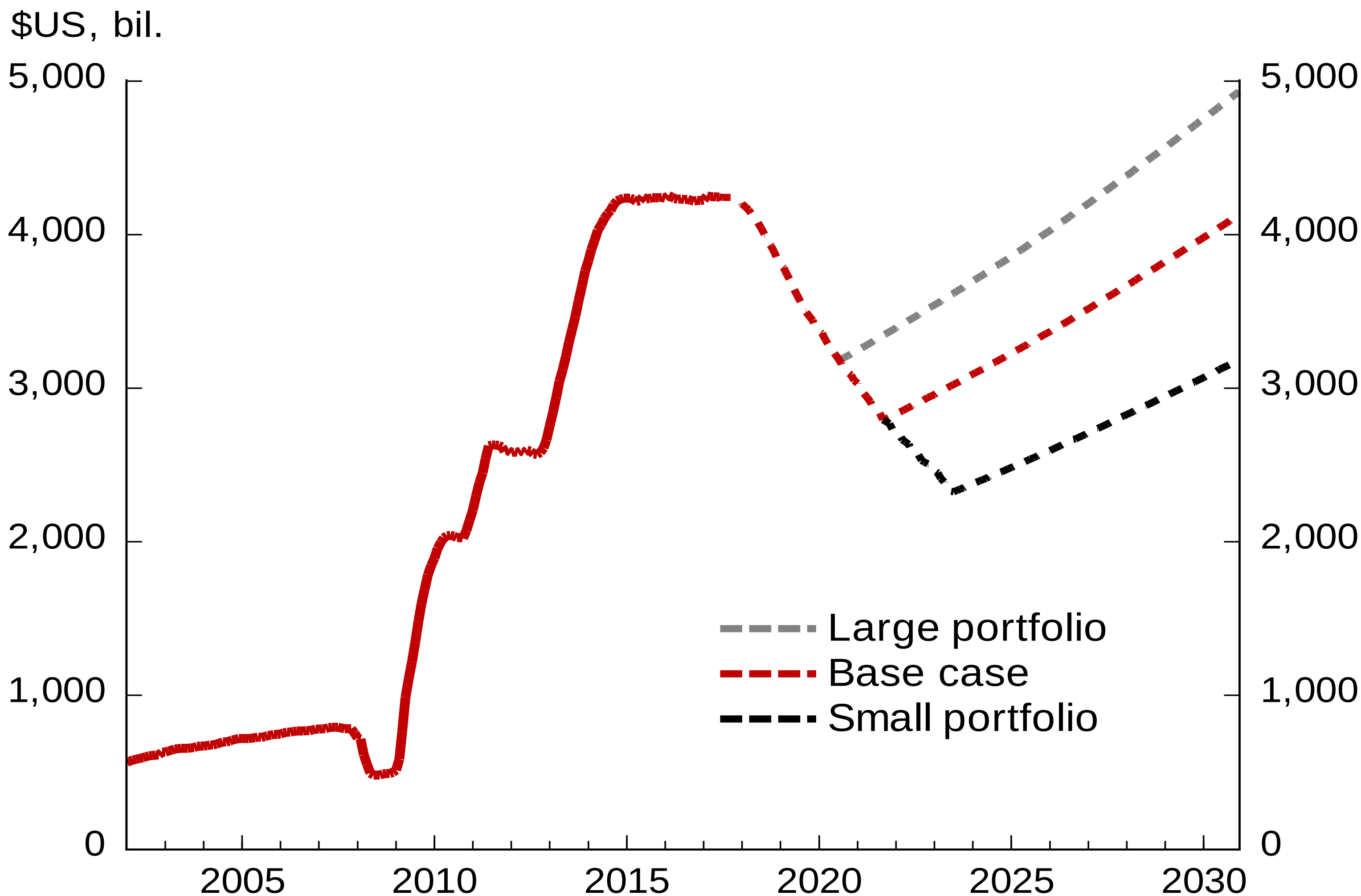
Alternative scenarios for the Federal Reserve's balance sheet



Source: Federal Reserve, Nomura Economics

Fed balance sheet "normalization": *Alternative endpoints*

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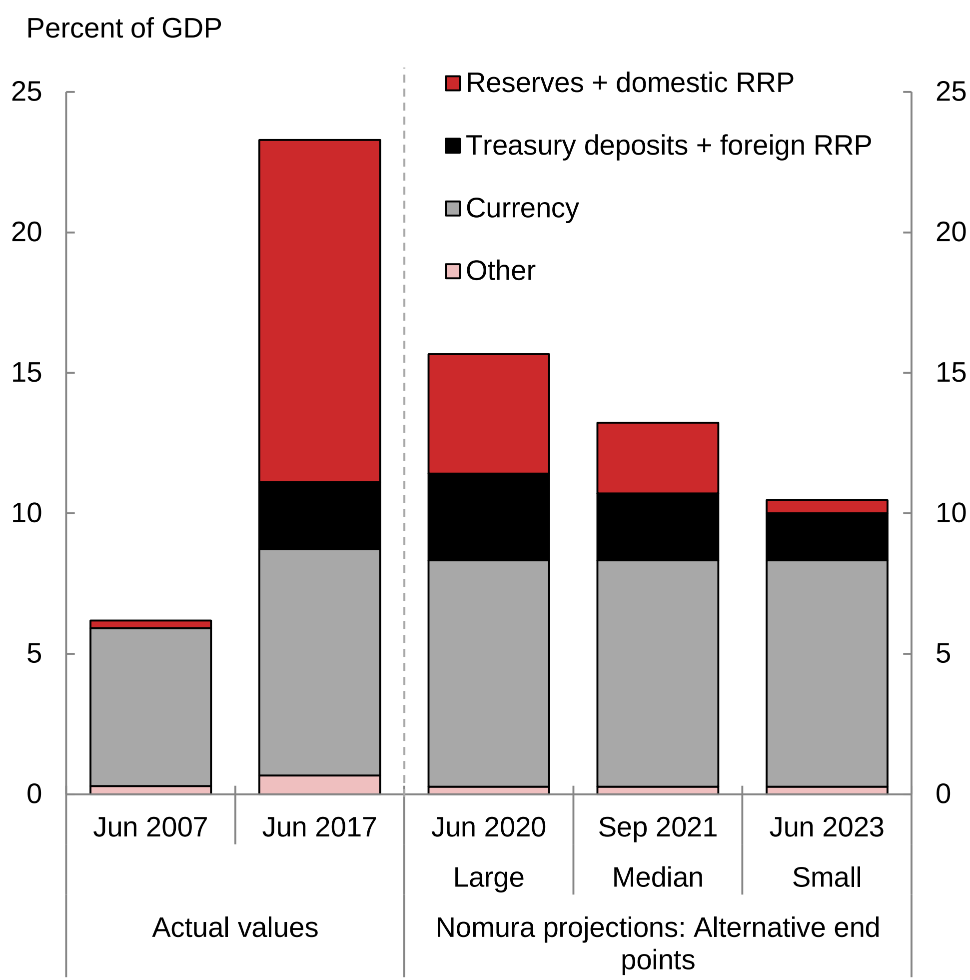
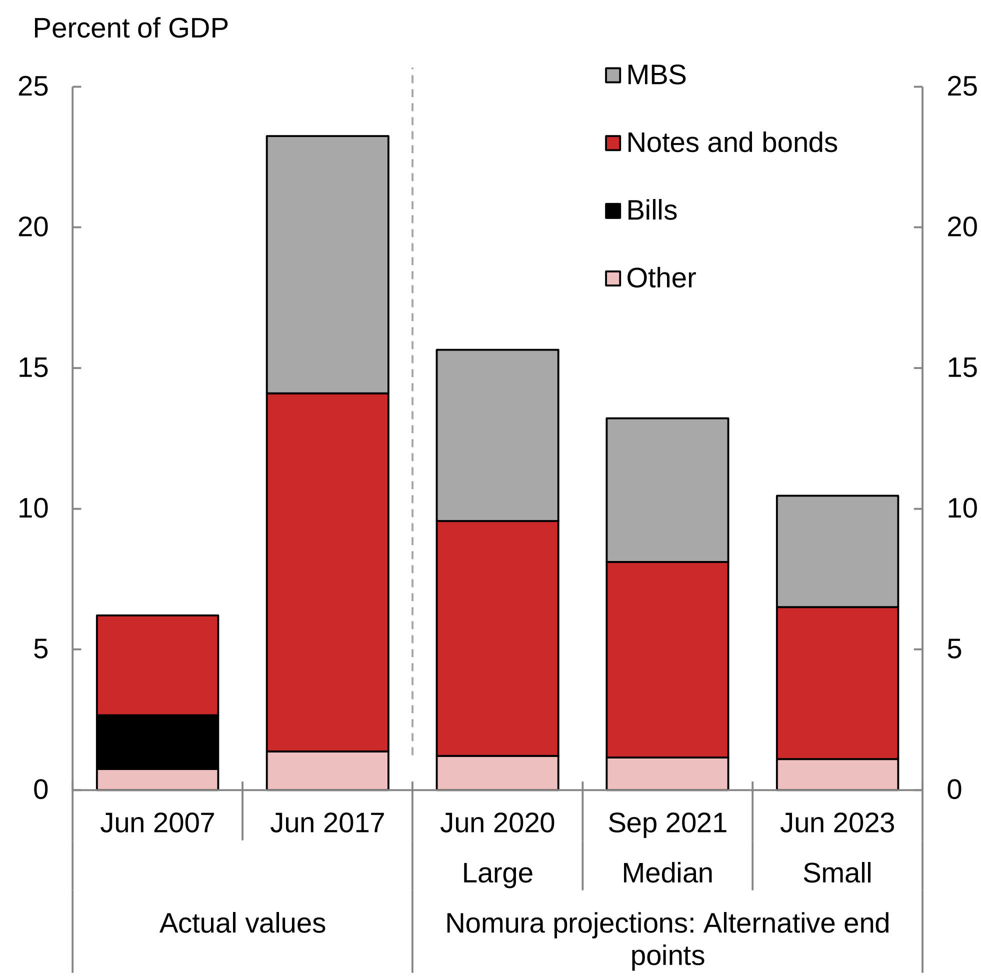
SOMA: Alternative projections for liabilities



SOMA: Alternative projections for assets

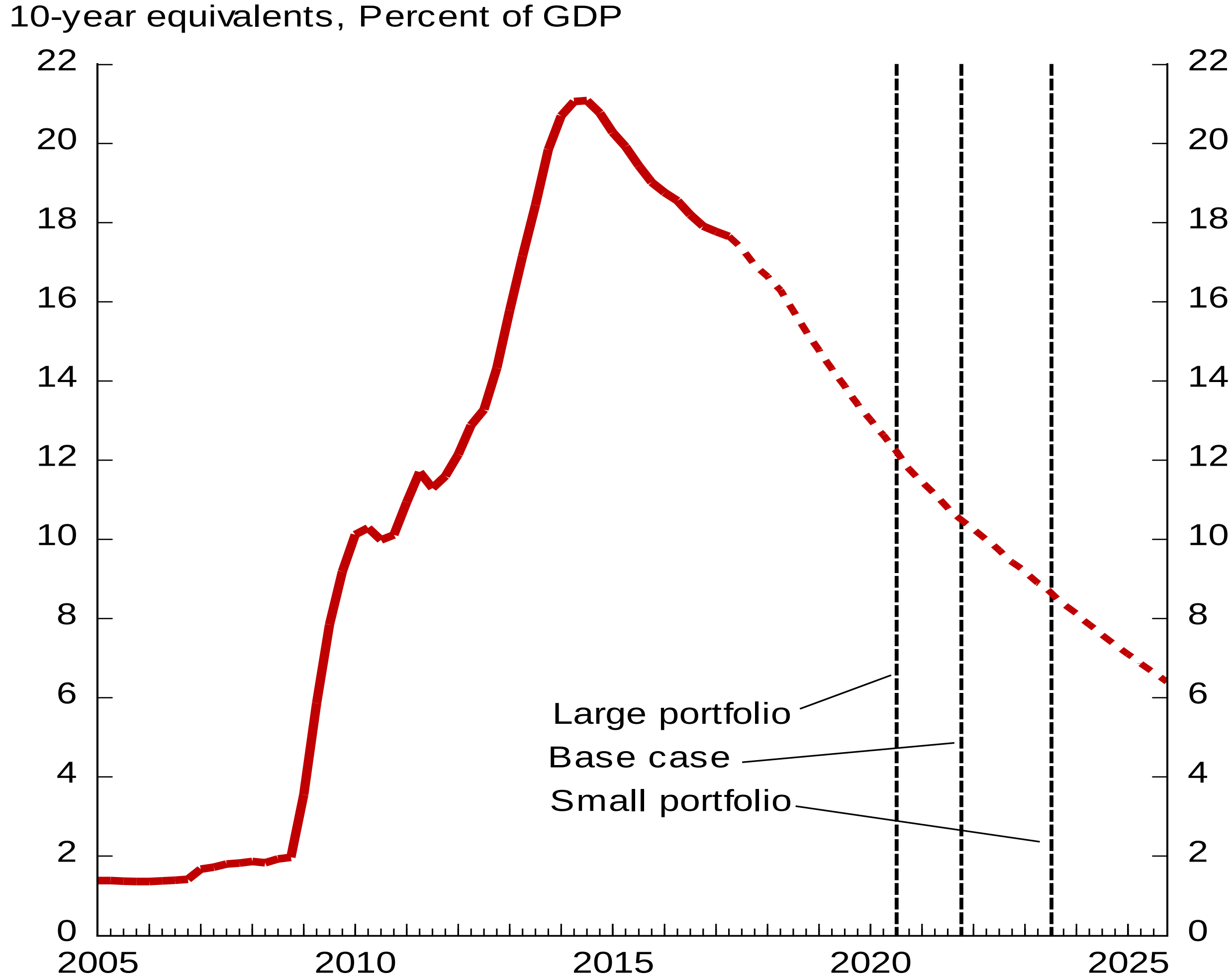


Source: Federal Reserve, Nomura Economics

Fed balance sheet "normalization": *Duration*

- The duration of the Federal Reserve's assets has been declining since late 2014.
- From 1951 to 2007, roughly 40% of Federal Reserve assets were Treasury bills. Now it has only long-term securities.
- When the nominal size of the Fed's portfolio stops falling it will still have a substantial amount of duration.

Total duration*, MBS and Treasury



Duration aggregation based on the parameters of the Li-Wei model, as presented in Li and Wei (2014). Source: Federal Reserve, Nomura Economics

Fed balance sheet “normalization”:
Impact on Treasury term premia

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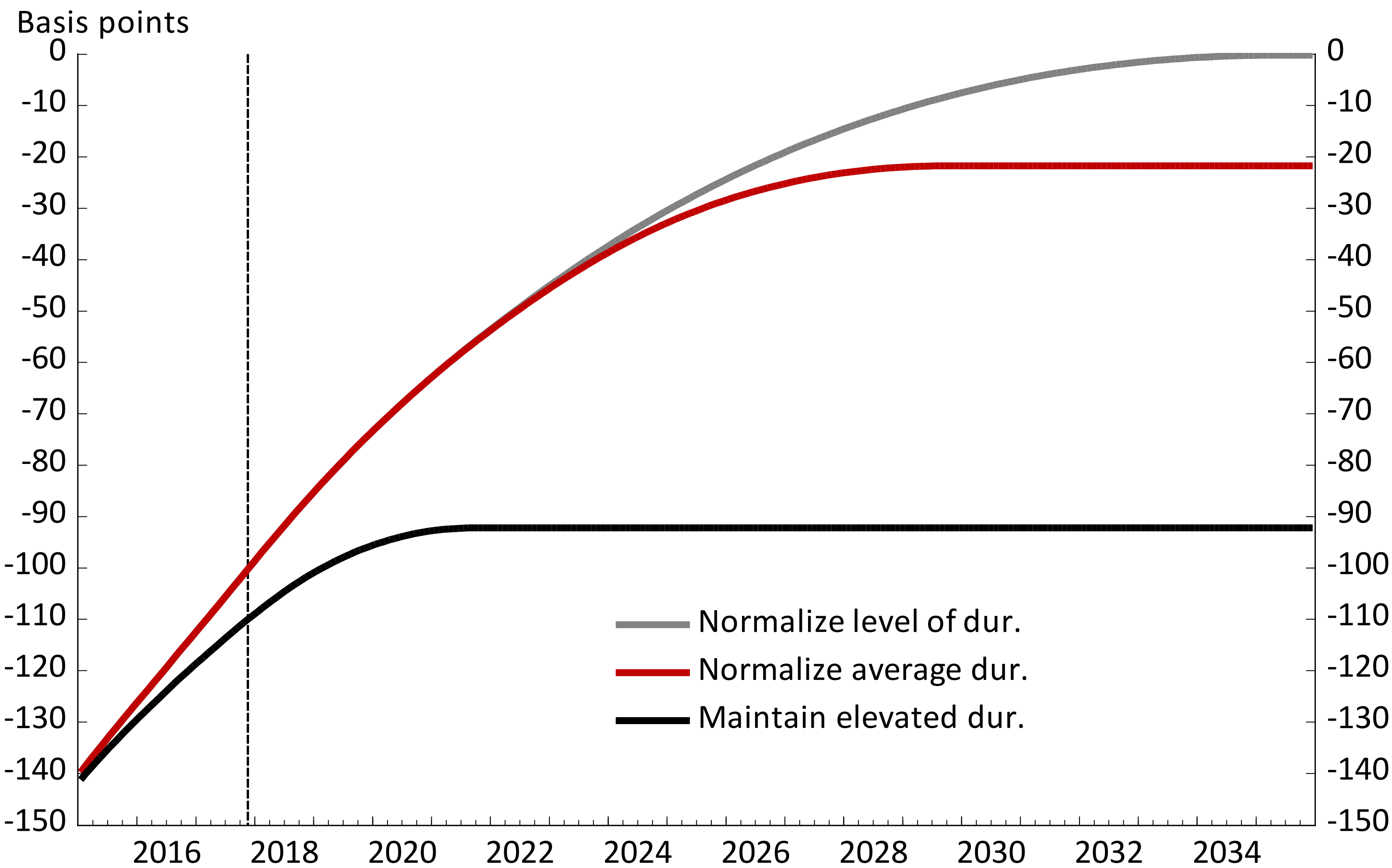
Model estimates how balance sheet normalization will affect 10yr term premia



Estimates based on model presented in Li and Min (2014). See Alexander et al (2017) for more details.
Source: Federal Reserve and Nomura Economics

Another practical problem

- ***Should the FOMC care about the slope of the yield curve?***
- ***A flatter curve means:***
  - More room to cut short-term interest rates
  - Less incentive for private maturity transformation.

Source: Nomura Economics

"The Committee also anticipates that … the Federal Reserve's securities holdings will continue to decline in a gradual and predictable manner until … the Federal Reserve is holding no more securities than necessary to implement monetary policy efficiently and effectively."

FOMC, statement on Policy Normalization Principles and Plans, June 13, 2017

- ***What sort of standard does this set?***

Source: Federal Reserve, Nomura Economics

"Efficient and effective" policy implementation

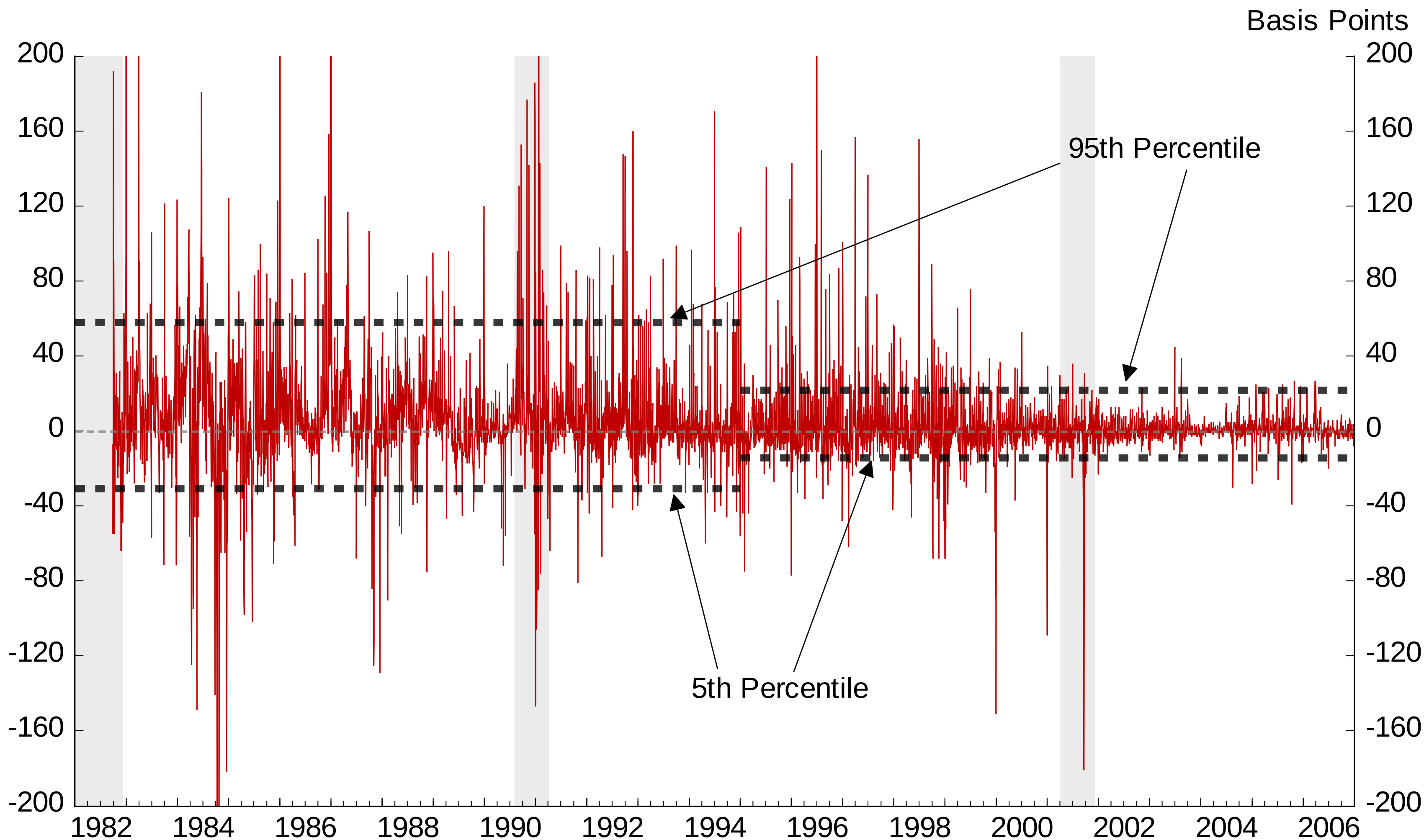
Does controlling short-term interest rates today require a large balance sheet?

- New sources of variance in the supply and demand for reserves will make controlling interest rates through scarcity a bigger challenge.
- Do modest deviations of the short-term interest rates from the FOMC's target undermine the effectiveness of policy?
  - How much variance can the system tolerate?
  - Before 1994, when the FOMC did not reveal its target, this was a different problem.

Source: Potter (2017), Logan (2017), Federal Reserve, and Nomura Economics

Controlling short-term interest rates through scarcity

Deviation of Fed funds effective from the FOMC target

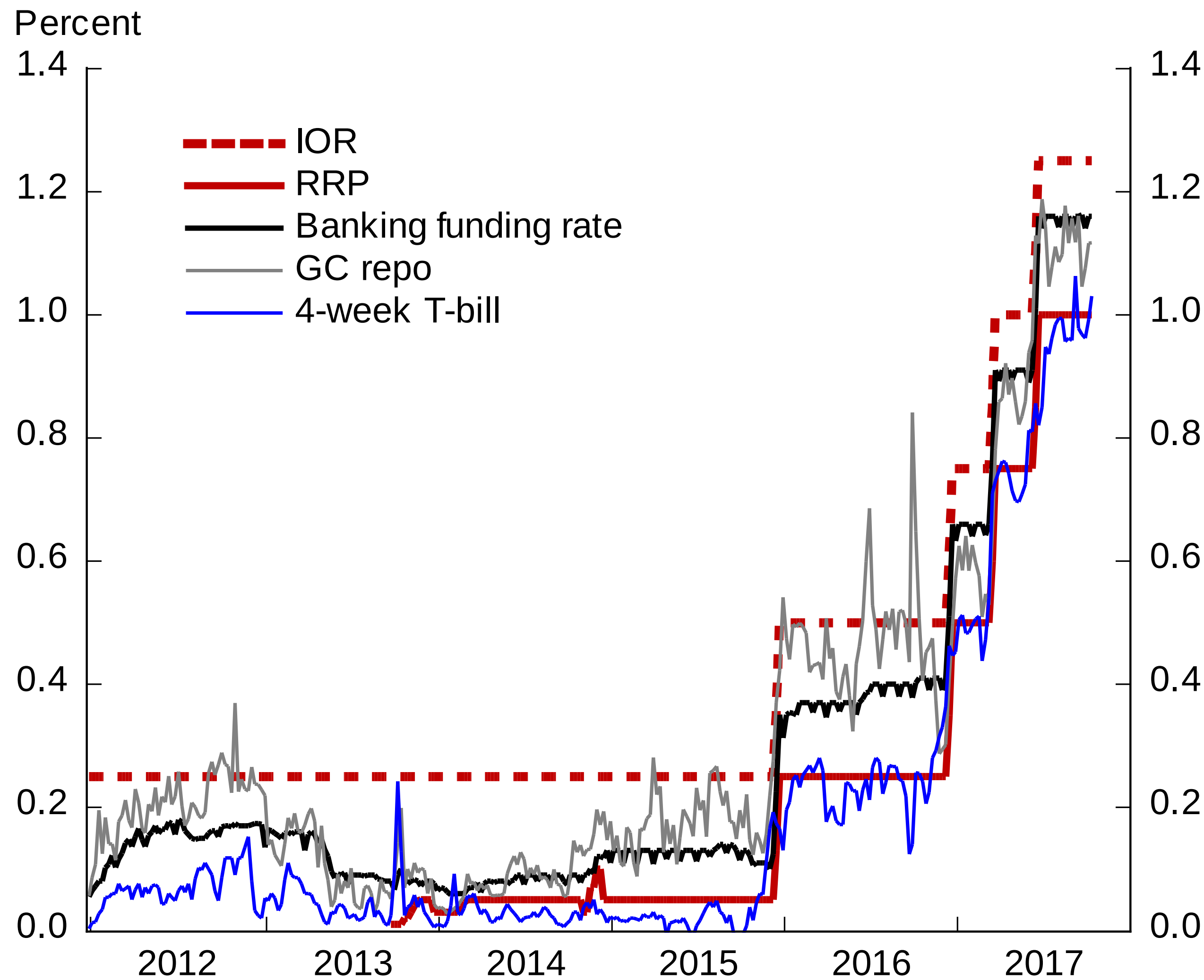


Source: Federal Reserve and Nomura Economics

Fed balance sheet "normalization": *Short-term interest rates*

- Since the GFC the super-abundance of reserves and new regulations have affected the nexus of short-term interest rates
- For example, the leverage ratio limits the degree to which The Federal Reserve's IOR rate anchors other short-term interest rates.
- Since 2013 the Federal Reserve has given a range of non-bank financial institutions access to its balance sheet through its reverse repurchase (RRP) program, earning the RRP rate.

Short-term interest rates



Source:Duffie and Krishnamurthy (2016); Klee, Senyuz, and Yoldas (2016); and Potter (2017), Bloomberg, Haver, Federal Reserve, and Nomura Economics.

Federal Reserve balance sheet and systemic risk

- ***Displacing private maturity transformation***
- ***Maintaining a “big footprint” in money markets***
- ***Rolling back regulation***
- ***The roll of the Treasury***

Source: Nomura Economics

Complex nature of cash and funding markets

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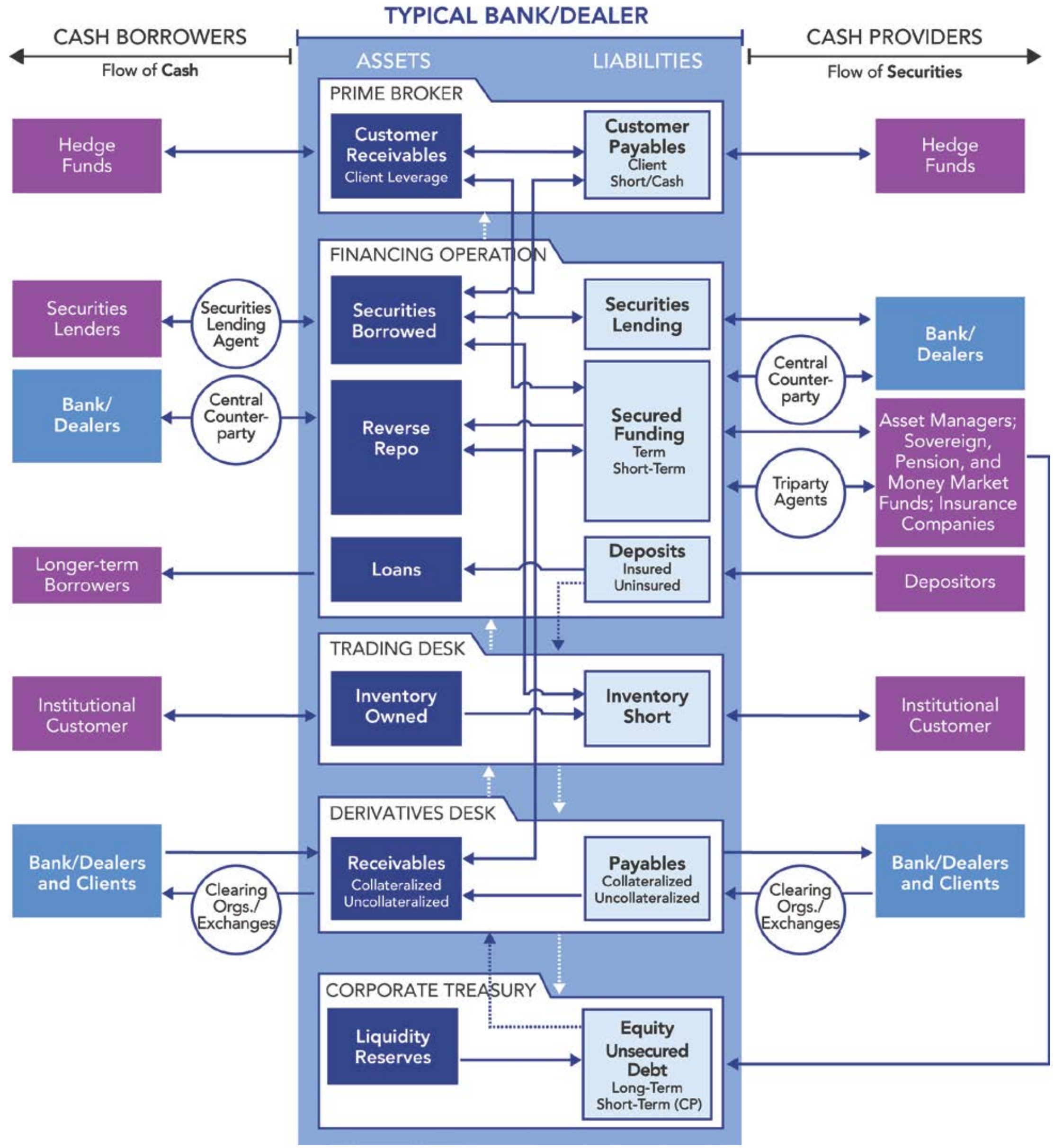
- Short-term money and funding markets are complex.
- Funding flows and the related credit and counterparty relationships occur in a complex network involving many diverse institutions.
- The figure to the right– taken from Aguiar, et al (2014) – shows funding flows coming into and out of a typical Bank/Dealer. For the flows of secured funding, it also shows the path of collateral and securities in the opposite direction.
- As short-term funding from key sources such as money market funds, pension funds and corporate treasurers move through the system, with Bank/Dealers playing a central role, risk is transformed and reallocated.
- How the Federal Reserve interacts with this system – by providing reserves to banks, RRP transactions with other institutions, and through its securities transactions – affects how this system operates and its stability.

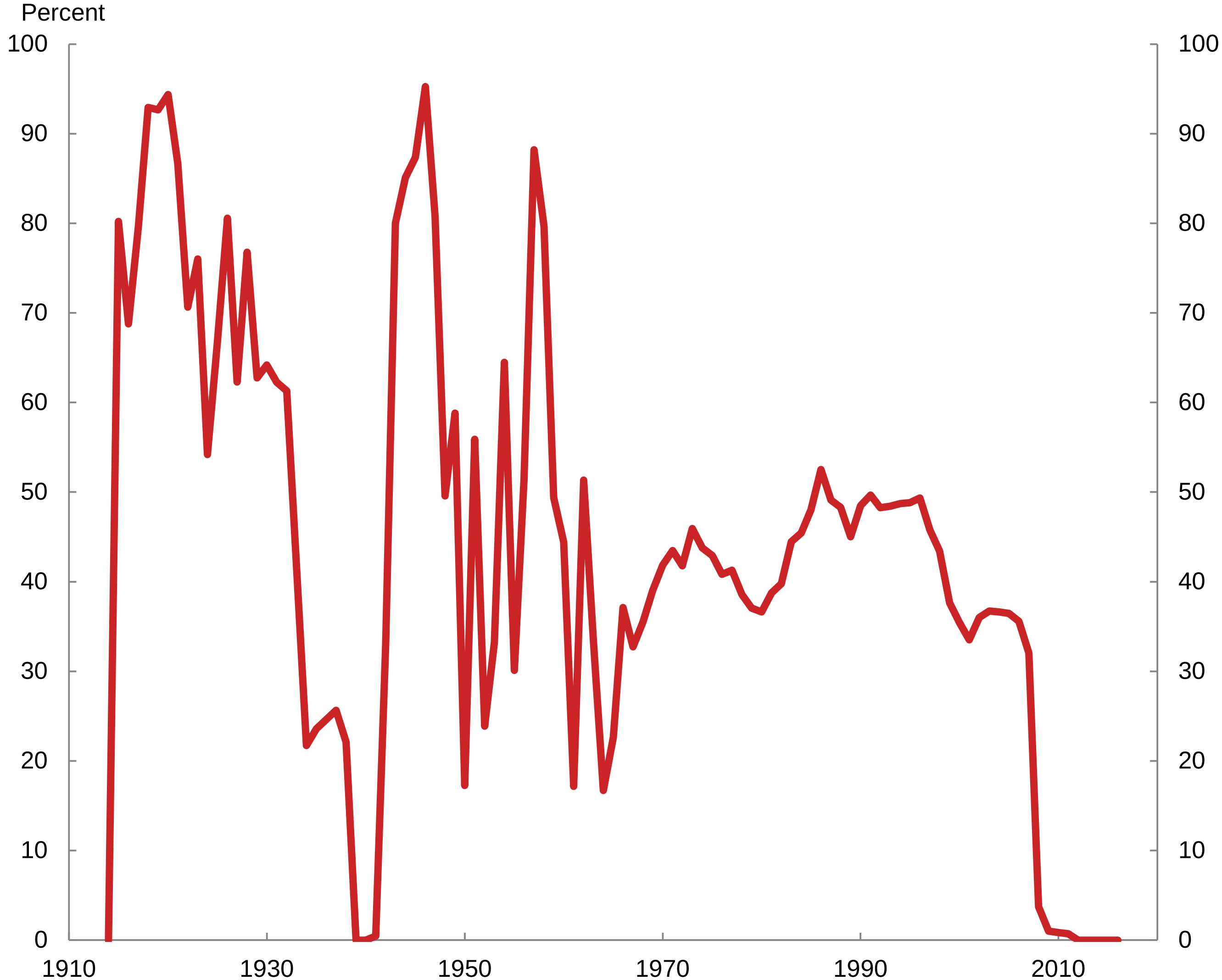


Source: Aguiar, et al (2014)

The Federal Reserve balance sheet

- Historically, the Federal Reserve has held a substantial amount of short-term securities.
- The Federal Reserve has not tried to use the composition of its assets as an instrument of monetary policy
  - This changed in the wake of the GFC.
- Selling short-term assets and buying long-term assets lengthened the average maturity of the assets on its balance sheet.

The Federal Reserve's holdings of short-term securities as a share of SOMA holdings*



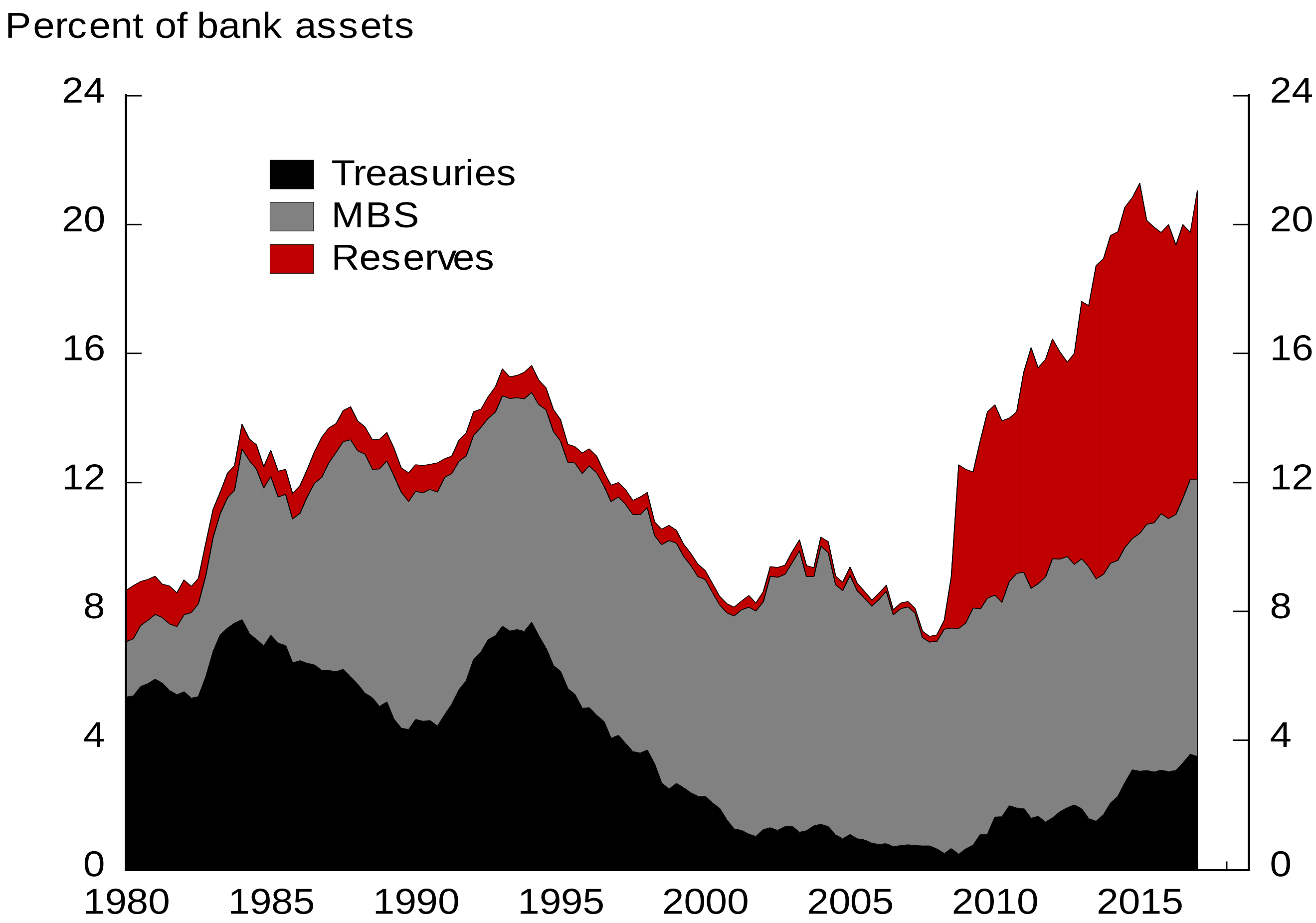
**Note: Short-term securities include Treasury bills, Treasury certificates, and bankers' acceptances.*
Source: Meulendyke (1998), Federal Reserve, and Nomura Economics

Fed balance sheet "normalization": *Impact on banks*

- **Banks have benefited from the Fed's provision of reserves.**
- **Banks will probably not absorb all the new Treasury and MBS supply as reserves fall.**

- Banks have benefited from the increased supply of Fed reserves. It has made it easier for them to meet increase requirements to hold high quality liquid assets.
- As the Fed's portfolio shrinks, banks could offset the decline in reserves by holding more Treasuries and agency MBS.
- But offsetting declines in reserves one-for-one with additional Treasuries and Agency MBS would require banks to take on more risk and it would push banks' holdings of securities to historically high levels.
  - Additional supply will probably be absorbed outside of the banking system.
  - Note that this will imply a shift in short-term funding away from banks as well.
- Whether or not the additional supply of Treasuries and MBS are absorbed inside or outside of the banking system, higher expected returns on these assets – reflected in term premia and MBS spreads – will probably be needed.

Treasuries, agency MBS and reserves on bank balance sheets



Source: Federal Reserve, Nomura Economics

Policy expectations and term premia

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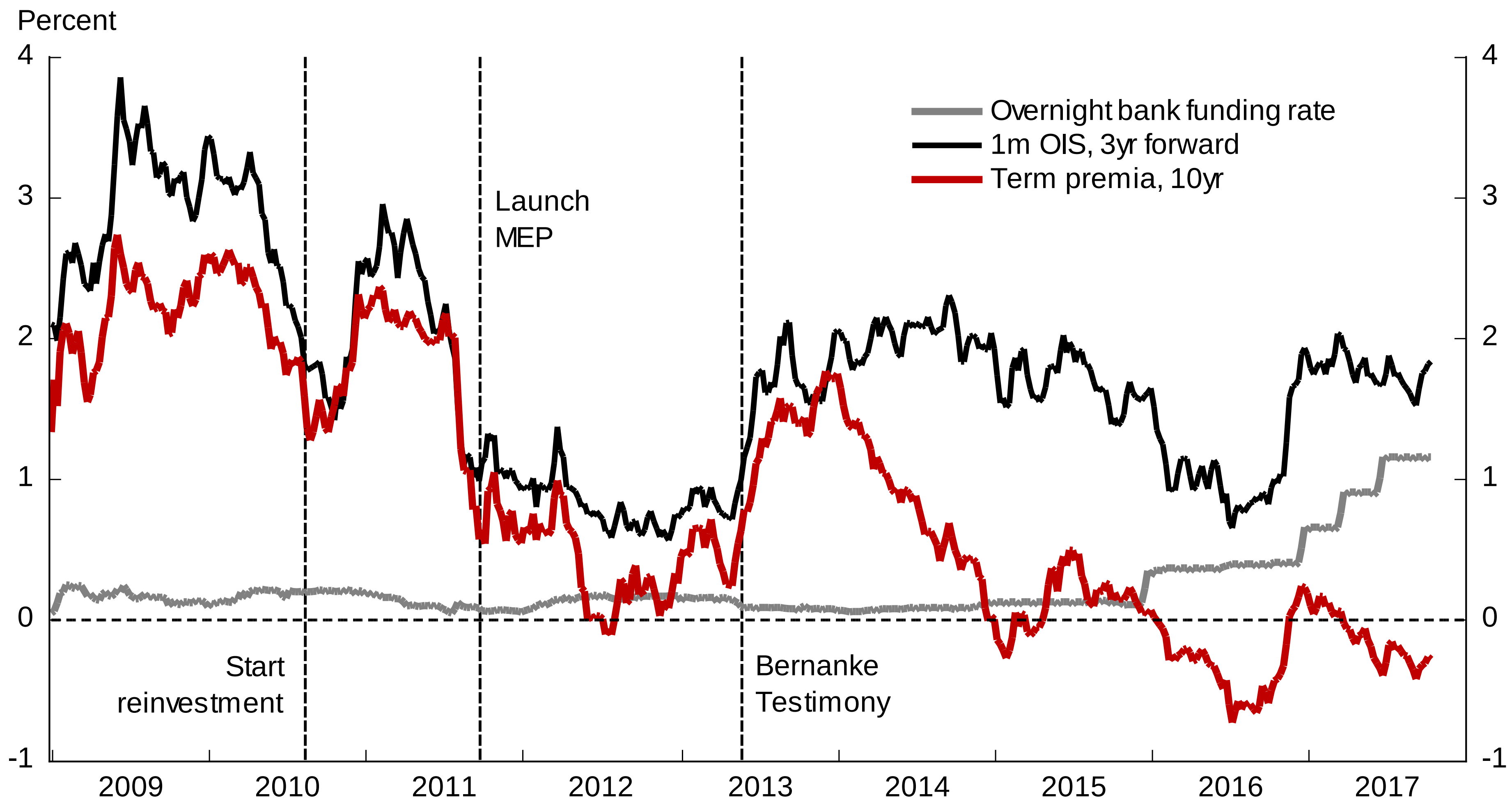
- **Through the "taper tantrum" term premia and policy expectations moved together**

10yr term premia and expectations for short-term interest rates



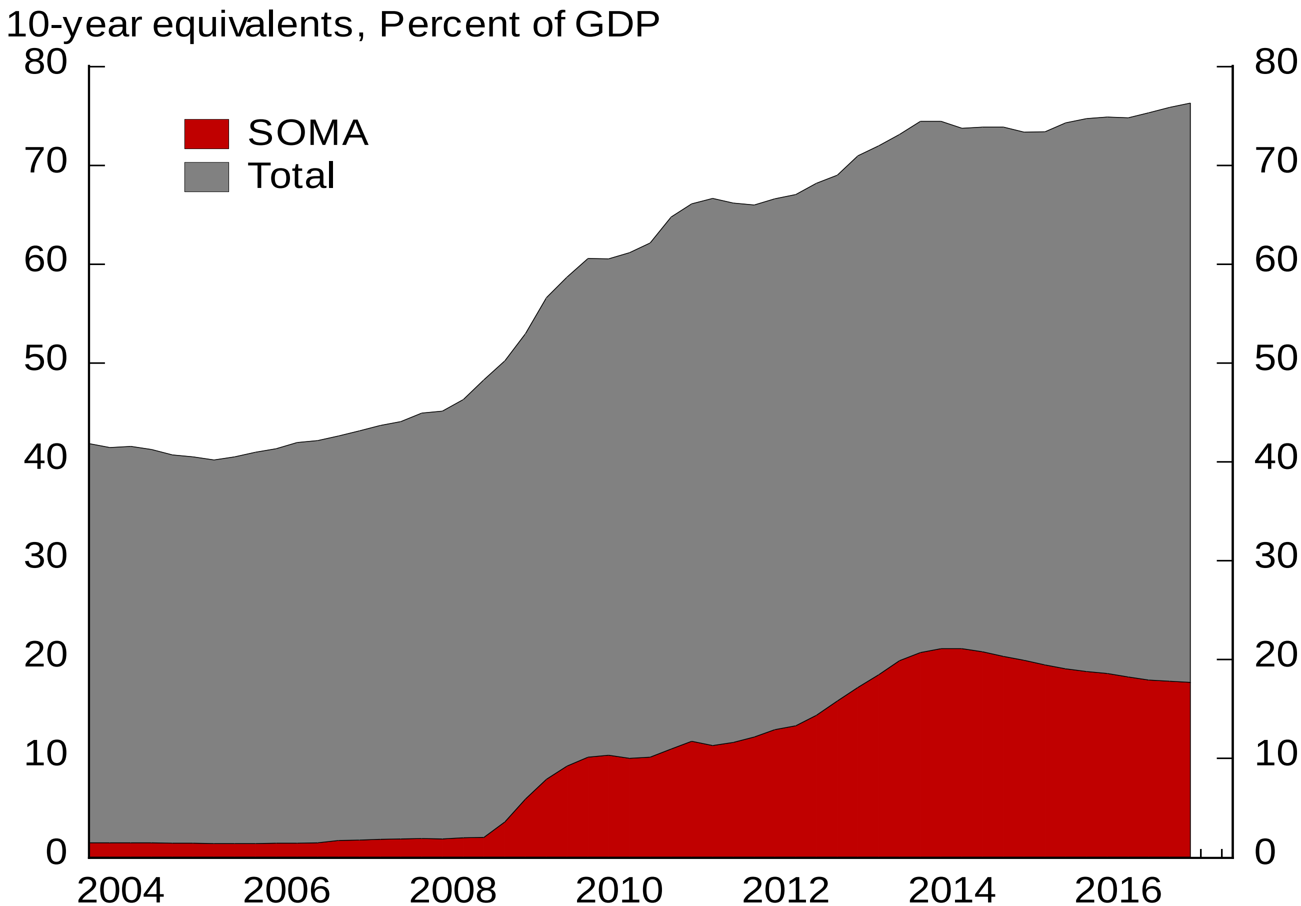
Source: Bloomberg, Federal Reserve, Nomura Economics.

Other factors affecting the supply and demand for duration

- **The supply of duration increased substantially over the last decade**
- **The Fed has only absorbed a portion of that increase**

- In the last decade there was a substantial increase in Treasury debt outstanding.
  - The Federal Reserve has absorbed only a portion of the increase in the supply of Treasury duration
  - So why are term premia substantially lower than they were 10 years ago?
- There are three obvious additional sources of demand
  - Foreign official holders of Treasuries increased their holdings by about $3 trillion over the last decade.
  - As a consequence of the global financial crisis in 2007-09, and the subsequent euro-area crisis, there has been deterioration in the perceived quality of a range of assets that formerly were considered “safe”.
  - Other major central banks are engaged in their own “QE” programs.
- None of this suggests that the “normalization” of the Fed’s balance sheet will not push term premia higher.

Aggregate Treasury and MBS duration outstanding*

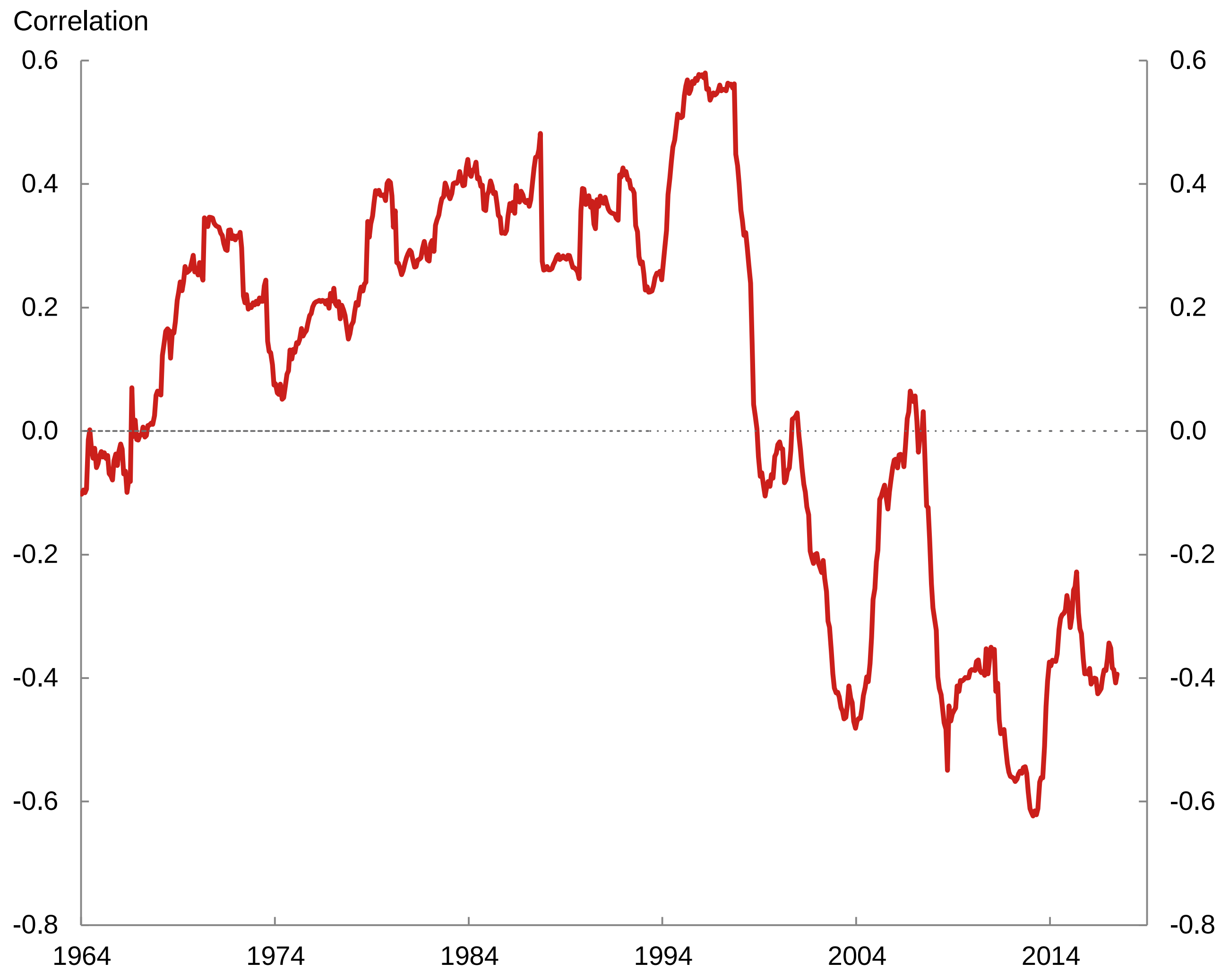


**Duration aggregation based on model in Li and Wei (2014).*
Source: Federal Reserve and Nomura Economics

Fed balance sheet "normalization": Equities' impact on Treasury term premia

- Inversely correlated relationship between US Treasuries and equity prices contributed to low term premia.
- Treasuries are attractive now, in part, because they can be a hedge for equities.

Rolling 2-year correlation between daily changes in the S&P500 and 10-year Treasury bond prices



Source: Bloomberg and Nomura Economics

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Appendix A-1

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