FEDERAL RESERVE BANK *of* NEW YORK

The Federal Reserve Balance Sheet Risks

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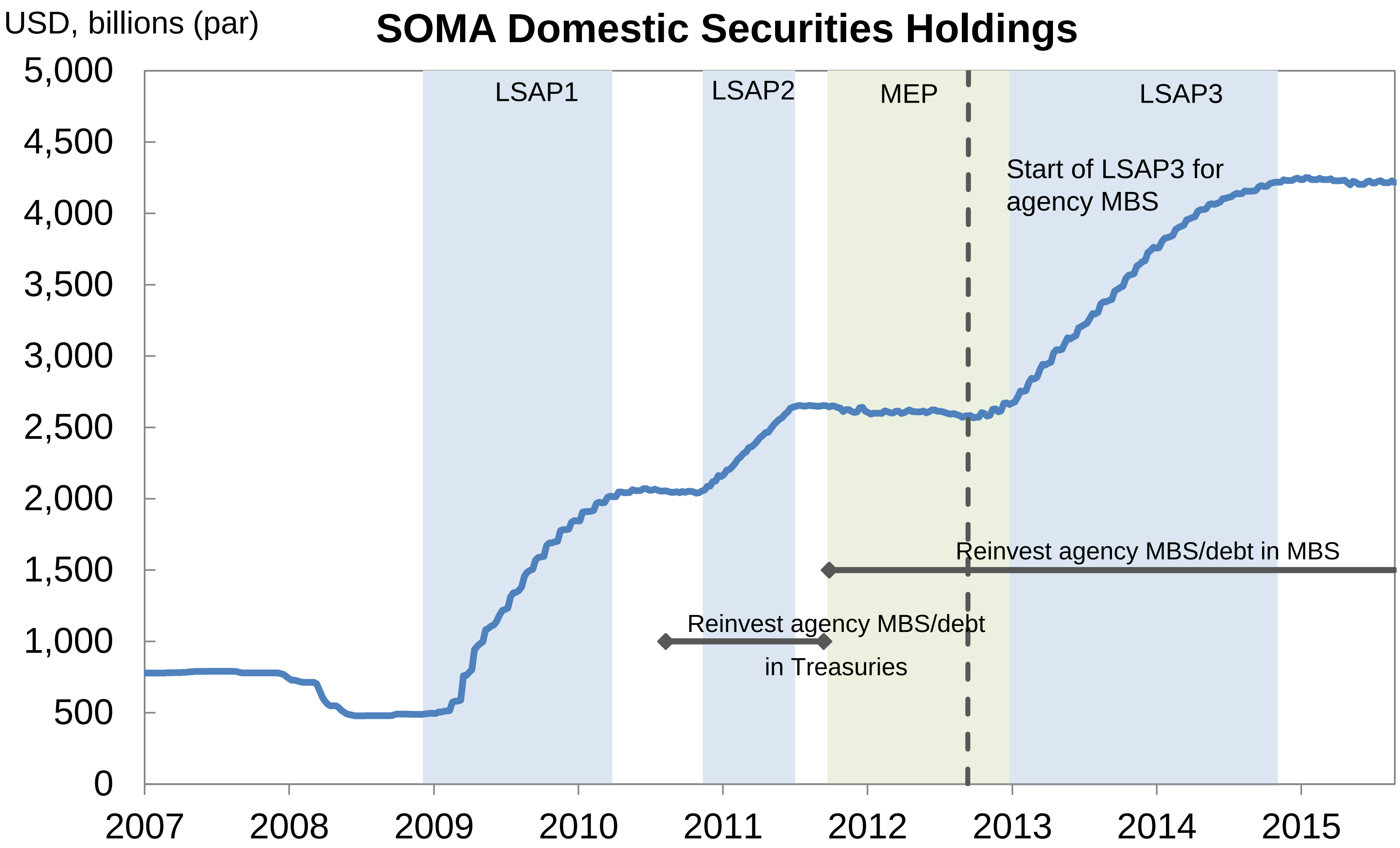
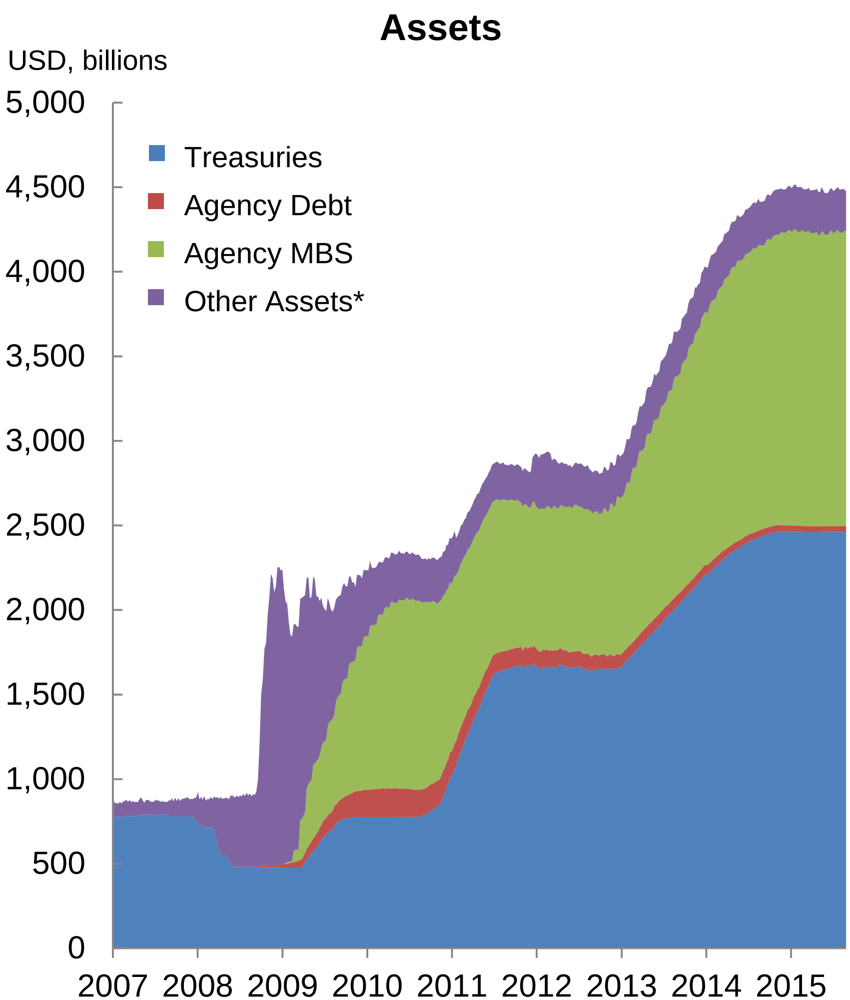
The Evolution of the Federal Reserve's Balance Sheet and Income

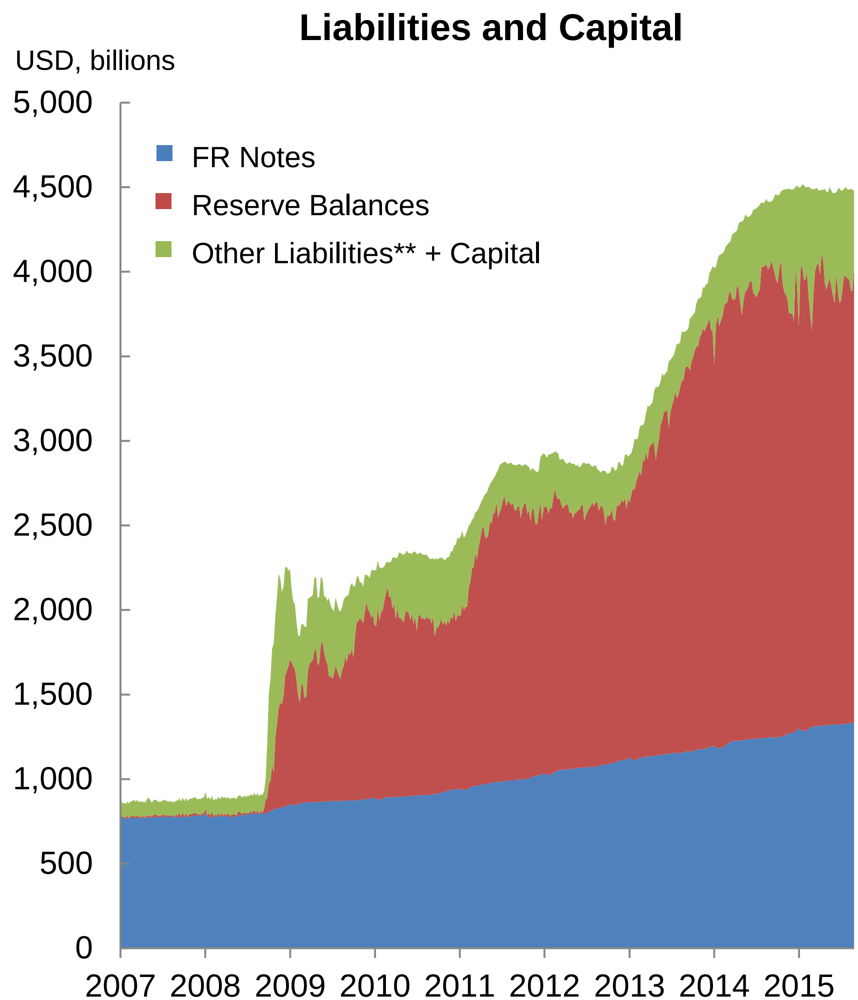
Timeline of Asset Purchase Programs



Source: Board of Governors of the Federal Reserve System

Evolution of the Federal Reserve's Balance Sheet





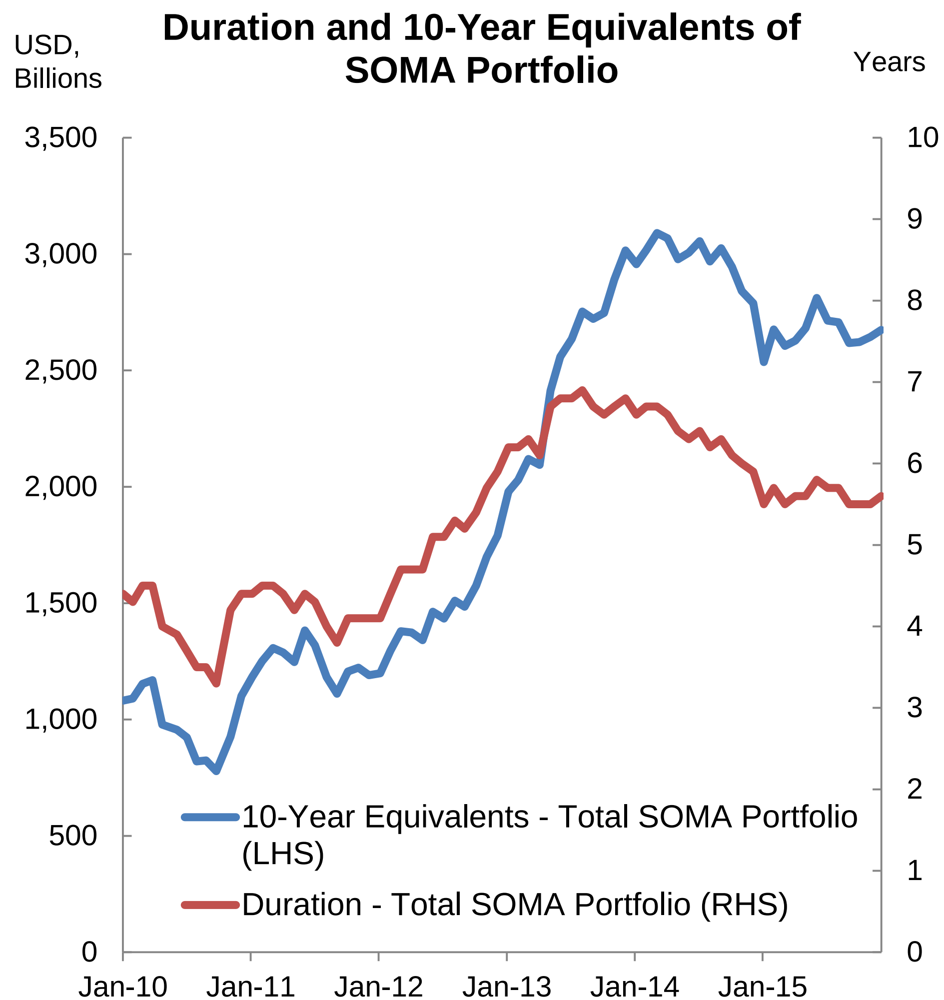
* Includes DW, crisis facilities, central bank liquidity swaps, foreign portfolio, and unamortized premiums and discounts.

** Includes Treasury General Account and reverse repos.

Source: Board of Governors of the Federal Reserve System

SOMA Portfolio Risk Measures

- **Interest rate sensitivity of portfolio has increased in recent years**
  - Attributable to both the altered composition of the portfolio as well as generally lower market interest rates
  - The average maturity of the Treasury portfolio increased substantially through the Maturity Extension Program (MEP)
  - Prepayments attenuate the increase in duration of the MBS portfolio as interest rates decline
  - Decline in portfolio duration since the end of the MEP results from the aging of the Treasury portfolio (given a substantial period of no Treasury reinvestments)

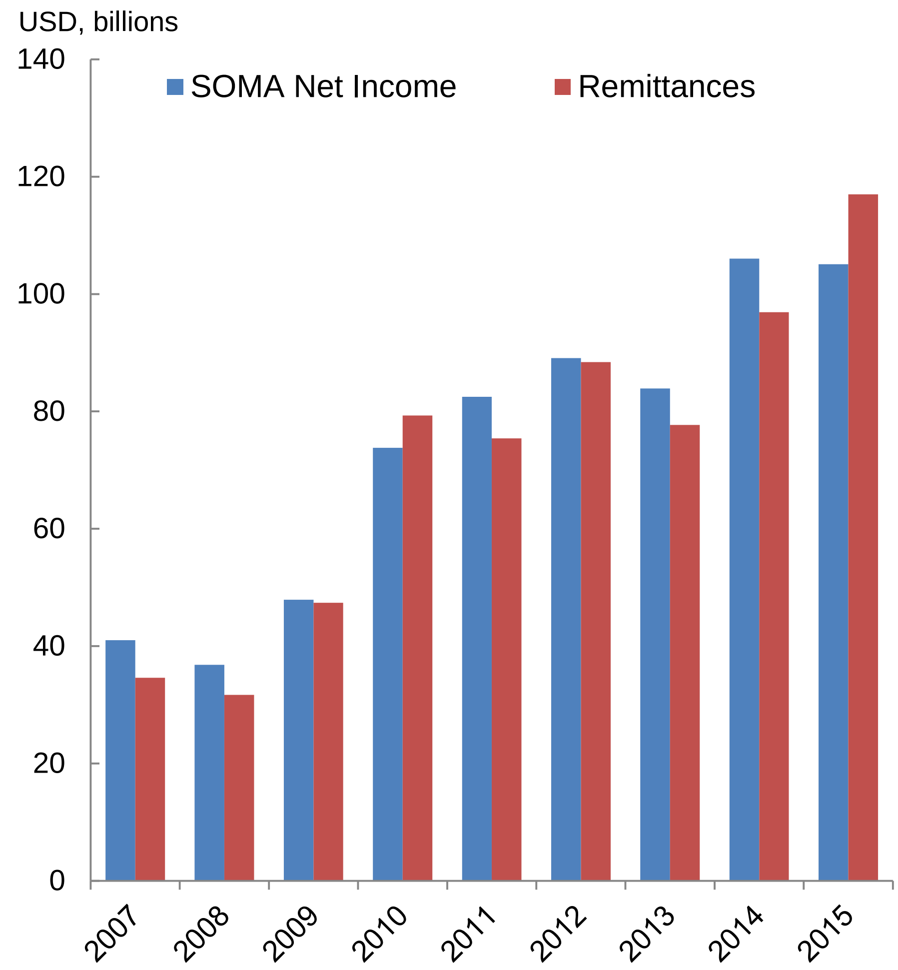


Source: FRBNY.

SOMA Net Income and Remittances to Treasury

- **Portfolio net income has increased substantially in recent years**
  - With consistently upward sloping yield curve, coupon income from purchases of relatively long maturity assets substantially exceeded interest expense on shorter maturity liabilities
  - No interest paid on currency

- **Remittances to Treasury are similarly elevated**
  - Remittances to Treasury = net income less operating expenses, dividends to member banks and transfers to/from surplus
  - FAST Act mandated one time transfer of $19.3b to Treasury from capital surplus in 2015



Source: FRBNY.

Note: 2015 includes a one time payment of $19.3 billion to the U.S. Treasury to satisfy the capital requirements as a result of the FAST Act.

Federal Reserve Interest Rate Risk

Federal Reserve Balance Sheet Modeling

- There is considerably complexity involved in modeling the dynamics and idiosyncrasies of all assets and liabilities on the Federal Reserve's balance sheet
- A number of academic papers have modeled aspects of Federal Reserve balance sheet dynamics under various forecast scenarios
  - Hall and Reis (2015)
  - Christensen, Lopez and Rudebusch (2015)
  - Greenlaw, Hamilton, Hooper and Mishkin (2013)
  - Carpenter et.al. (2013)
- FRBNY model
  - Designed to assess the balance sheet and income implications of alternative policy choices
  - Models all material assets and liabilities at a granular level (e.g. at security level for Treasury securities)
  - Utilizes numerous sub-models (e.g. MBS prepayment model, Treasury auction forecast model)
- FRBNY model dynamics are broadly similar to those in academic papers, but model outputs are more detailed and incorporate institutional nuances and policy constraints

Scenario Assumptions

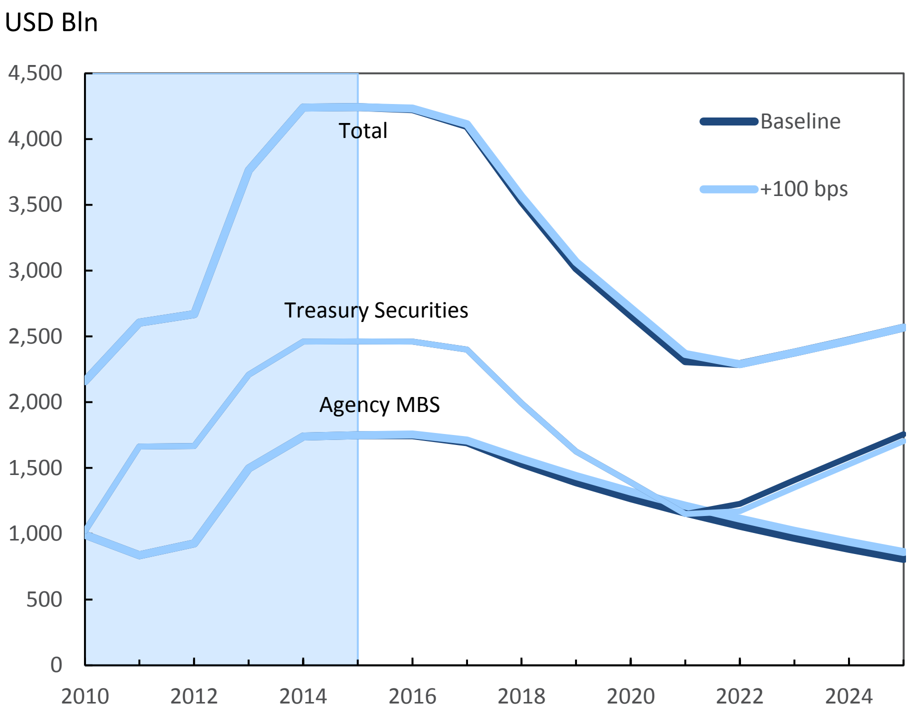
- Assumptions on interest rates and normalization drawn from December 2015 *Survey of Primary Dealers* and *Survey of Market Participants*
  - Interest rates
    - Federal funds target rises slowly to 3.5% in the long run
    - 10-year Treasury yield rises gradually to 3.75% in the long run
  - Normalization framework is generally consistent with FOMC's Policy Normalization Principles and Plans, with details from surveys
    - Administered rates/tools
      - IOER at top and ON RRP rate at bottom of target range for fed funds
      - Spread of 25 bps between IOER and ON RRP rates
      - ON RRP facility usage is elevated after liftoff, then declines
    - Balance sheet tools
      - Full reinvestments continue until Q1-2017, then phased out over 1 year
      - No asset sales
- Additional simplifying assumptions
  - Balance sheet size reaches steady state when reserves fall to $100b
  - Other balance sheet items evolve in line with recent trends

Balance Sheet Projections

- **Baseline projection**
  - Taper reinvestments starting in 2Q17, end reinvestments in 2Q18
  - Balance sheet declines through 2021 when level of reserves falls to $100b (the "steady state"), expands subsequently matching rate of currency growth

- **Alternative rate scenario**
  - Baseline assumptions with instantaneous interest rate shock
  - Rate shock has modest impact on portfolio share of Treasuries vs. MBS (arises from alternative MBS prepayments), does impact coupon composition

PROJECTED SOMA SECURITIES HOLDINGS: BASELINE AND +100 BPS SHOCK



Source: Federal Reserve Bank of New York.

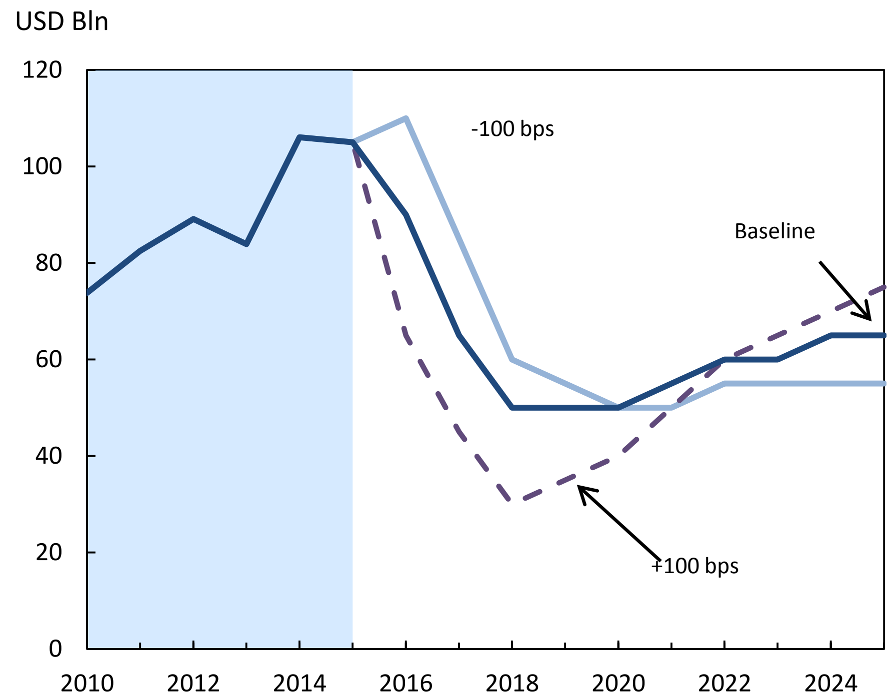
Notes: Figures for 2010-15 (shaded area) are historical settled holdings.

Income Projections

- **Baseline projection**
  - Net income roughly follows contours of portfolio size
  - Declining portfolio size reduces both interest income and expense, all else equal
  - However, rising interest rates substantially increase interest expense relative to interest income
  - After reaching "steady state", resumption of asset purchases supports income growth

- **Alternative rate scenarios**
  - Higher rates reduce net income by larger amount relative to baseline due to increased interest expense, partially offset in short run by increase in coupon income on reinvested securities

PROJECTED SOMA NET INCOME: ALTERNATIVE INTEREST RATE PATHS



Source: Federal Reserve Bank of New York.

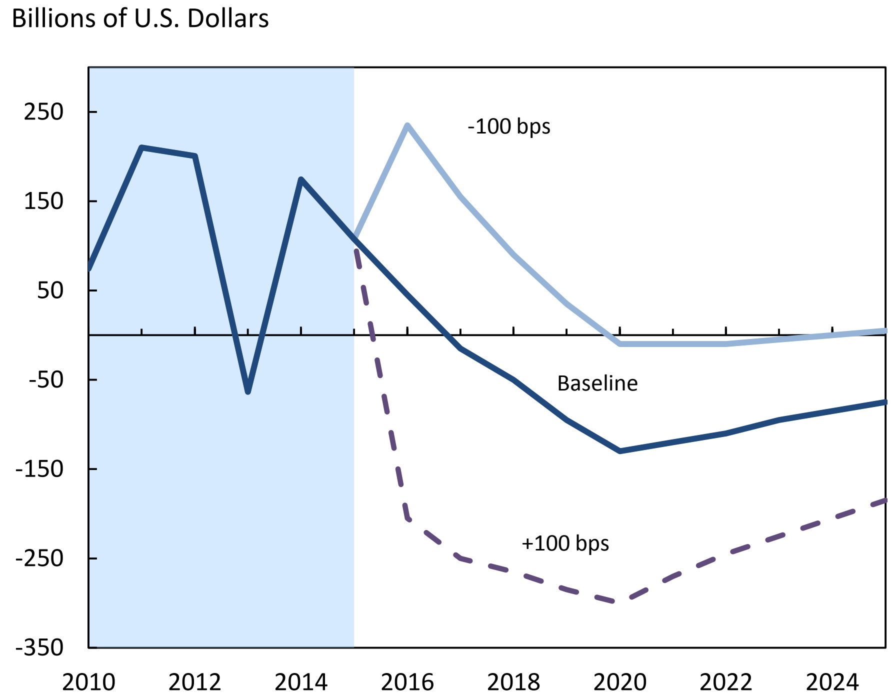
Notes: Figures for 2010-15 (shaded area) are realized returns. Projected figures are rounded. Higher- and lower- rate scenarios use baseline interest rates plus or minus 100 basis points.

Unrealized Gain/Loss Projections

- **Baseline projection**
  - Unrealized p/l declines gradually with projected rise in interest rates, attenuated by decline in the size of the portfolio
  - Unrealized p/l begins to rise with the leveling off of interest rates and after reaching “steady state” renewed asset purchases at prevailing market rates
  - Unrealized p/l exaggerates potential realized loss as reduction in portfolio size is constrained by currency

- **Alternative rate scenarios**
  - Higher rates further reduce mark-to-market value of portfolio assets, curtails MBS prepayment speeds (slowing reinvestments into higher yielding MBS)

PROJECTED SOMA UNREALIZED P/L: ALTERNATIVE INTEREST RATE PATHS



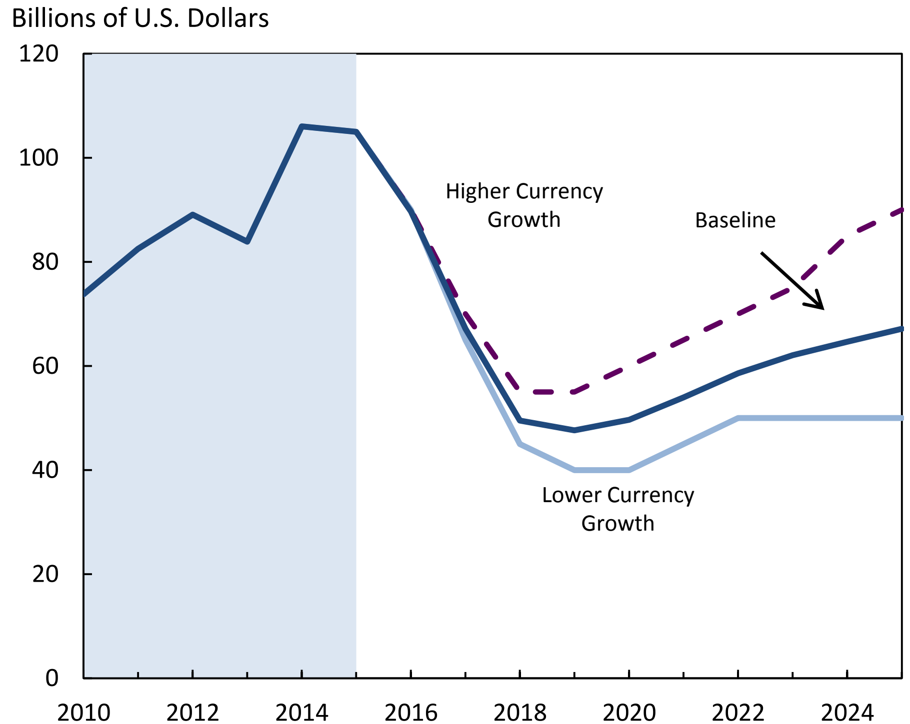
Source: Federal Reserve Bank of New York.

Notes: Figures for 2010-15 (shaded area) are realized returns. Projected figures are rounded. Higher- and lower- rate scenarios use baseline interest rates plus or minus 100 basis points.

Income Projections: Alternative Liabilities

- **Baseline projection**
  - Projected income is sensitive to the composition of liabilities
  - A lower assumed growth rate for currency (a non-interest bearing liability) materially lowers projected net income
    - Results from both higher interest expense and portfolio needing to decline to smaller size to reach "steady state"

PROJECTED SOMA NET INCOME: ALTERNATIVE CURRENCY GROWTH SCENARIO



Source: Federal Reserve Bank of New York.

Notes: Figures for 2010-15 (shaded area) are realized returns. Projected figures are rounded. Higher and lower currency growth scenarios use baseline annualized growth rates plus or minus 3 percentage points.

Appendix I: Institutional Context

Accounting Principles

- Securities holdings are reported at amortized cost, not fair value.
- Amortized cost represents the face amount (par value) of security holdings plus (minus) any remaining unamortized premium (discount).
  - Purchased premium (discount) is amortized each year
- Securities transactions (purchases and sales) are recorded on settlement date, not trade date

Income

- The Federal Reserve releases annual audited financial statements.
  - Quarterly unaudited financial statement is also released
- Annual Report on Domestic Operations presents information about open market operations and analysis of the SOMA domestic portfolio.
- Federal Reserve income primarily reflects SOMA portfolio interest.
- SOMA interest income represents coupon income less the amortization of net premiums.
- Non-interest income includes items such as gains/losses on securities sales, the foreign currency revaluation of non-USD holdings and priced services.

Expenses

- Largest interest expense is interest paid on reserve balances.
- Term deposit facility
- Securities sold under agreement to repurchase:
  - Overnight and term reverse repos
  - Foreign official and international accounts
- Recall FR notes have no interest expense.
- Noninterest expense includes salaries and equipment.

Dividends and Transfers

- Until recently the Federal Reserve paid an annual dividend of 6 percent on the paid-in capital to its member banks. Recent legislation reduced dividend payments to banks with assets in excess of $10 billion.
- Recent policy has been for Reserve Banks to pay part of their net earnings into surplus so that surplus = capital paid in. Recent legislation caps future surplus balances to $10 billion.

Remittances to Treasury

- As required by statute, earnings after payment of dividends and capital are remitted to the U.S. Treasury.
- Remittances have grown substantially over the past few years reflecting large SOMA interest income and minimal interest expense.

Remittances to Treasury (cont'd)

- If earnings fall short of the amount necessary to cover operating costs, pay dividends, and equate surplus to capital paid-in, the Federal Reserve books a deferred asset.
- Value represents the amount of earnings the Federal Reserve needs to accumulate before it resumes remitting residual earnings to the U.S. Treasury.
- From time to time, on a weekly basis, an individual Bank has recorded a deferred asset; however, deferred assets are generally short-lived.
- On the H.4.1 statistical release this will be recorded as a liability of "earnings remittances due to U.S. Treasury."

Unrealized Gains and Losses

- As a result of the accounting for the portfolio at amortized cost, changes in unrealized gains/losses on securities holdings are not reflected in the income statement.
- Securities fair value and unrealized gains/losses are disclosed in the unaudited Quarterly Financial Report and annually in notes to audited financial statements.
- Losses would only be realized in case of a sale of securities.
  - Unrealized gains/losses would likely not be realized on the entire portfolio, as historically the Federal Reserve has held securities to back currency and other reserve factors.

Appendix II: References

Federal Reserve References

- Domestic Open Market Operations During 2015
  http://www.newyorkfed.org/markets/annual_reports.html

- The Federal Reserve's Balance Sheet and Earnings: A Primer and Projections
  http://www.federalreserve.gov/pubs/feds/2013/201301/201301pap.pdf

- A History of SOMA Income
  http://libertystreeteconomics.newyorkfed.org/2013/08/a-history-of-soma-income.html#.VmTsUHLluM8

- The Federal Reserve's Audited and Unaudited Financial Statements
  http://www.federalreserve.gov/monetarypolicy/bst_fedfinancials.htm

Academic References

- Hall, Robert, and Ricardo Reis, "Maintaining Central Bank Financial Stability Under New-Style Central Banking," NBER working paper 21173, May 2015.

  http://www.nber.org/papers/w21173.pdf

- Christensen, Jens, Jose Lopez, and Glenn Rudebusch, "A Probability-Based Stress Test of Federal Reserve Assets and Income," *Journal of Monetary Economics*, 2015.

  http://www.frbsf.org/economic-research/files/wp2013-38.pdf

- Greenlaw, David, James D. Hamilton, Peter Hooper, and Frederic S. Mishkin, "Crunch Times: Fiscal Crises and the Role of Monetary Policy," NBER working paper 19297, August 2013. http://www.nber.org/papers/w19297.pdf

Federal Reserve Data and Policies

- FRBNY Open Market Operations landing page
  See for operating policies, FAQs, operations announcements, results
  http://www.newyorkfed.org/markets/openmarket.html

- Factors Affecting Reserve Balances (H.4.1 release)
  http://www.federalreserve.gov/releases/h41/

- SOMA holdings
  http://www.newyorkfed.org/markets/soma/sysopen_accholdings.html