

# Crunch Time: Fiscal Crises and the Role of Monetary Policy

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# Mechanics of debt accumulation

$b_t$  = debt/GDP

$s_t$  = (primary surplus)/GDP

$R_t$  = nominal interest rate

$g_t$  = nominal GDP growth rate

$1 + r_t = (1 + R_t) / (1 + g_t) \approx 1 + R_t - g_t$

$b_{t+1} = (1 + r_t)(b_t - s_t)$ .

# Fiscal sustainability

Suppose  $R_t - g_t = r^*$  is constant  
and current debt/GDP is  $b^*$ . Then holding  
debt/GDP constant requires a primary surplus of

$$s^* = \frac{r^* b^*}{1 + r^*}$$

$s^\circ$  = primary surplus that country could plausibly  
maintain given its politics and history

What happens if  $s^* > s^\circ$ ?

# Tipping points

$r_t^e$  = risk - free net interest rate

$r_t$  = promised net interest rate

$b^*$  = sustainable debt level

$\pi_t^Q$  =  $Q$  - measure probability of reform

$$1 + r_t^e = \pi_t^Q (1 + r_t) + (1 - \pi_t^Q) \frac{b^*}{b_t - s_t}.$$

# Data used in statistical analysis

- Panel of 20 different advanced countries
- Annual data, 2000-2011
- Question: What factors in year  $t - 1$  help predict the average yield on 10-year debt in year  $t$ ?

# Linear regression results

$$R_{it} = \hat{\alpha}_i + \hat{\gamma}_t + \underset{(3.95)}{0.0313}b_{i,t-1} + \underset{(2.30)}{0.0142}b_{i,t-1}^n - \underset{(5.16)}{0.184}c_{i,t-1} + e_{it}$$

$$R^2 = 0.69$$

$R_{it}$  = 10-year yield for country  $i$  year  $t$

$b_{i,t-1}$  = previous year's gross debt/GDP

$b_{i,t-1}^n$  = previous year's net debt/GDP

$c_{i,t-1}$  = previous 5 years' average current account surplus

$t$  statistics in parentheses

Example: if  $b$  and  $b^n$  both increase by one percentage-point then 10-year yield increases by 4.5 bp

<b>Study</b>	<b>Data</b>	<b>Finding</b>
Baldacci and Kumar (2010)	31 advanced & emerging economies, 1980-2007	1% ↑ in debt/GDP → 4 bp ↑ in 5y-10y forward rate
Ichiue and Shimizu (2013)	10 advanced countries, 1990-2010 (Germany only eurozone)	1% ↑ in govt debt/GDP plus 1% ↑ in external debt/GDP → 3 bp ↑ in 5y-10y forward rate
Laubach (2009)	U.S. CBO projections, 1976-2006	1% ↑ in debt/GDP → 3-4 bp ↑ in 5y-10y forward rate
Reinhart and Sack (2000)	G7, 1981-2000 (pre-euro)	1% ↑ in projected surplus/GDP → 12 bp ↓ in 10 yr - 3 m spread

# Nonlinear regression results

$$R_{it} = \hat{\alpha}_i + \hat{\gamma}_t + \underset{(0.30)}{0.0029} b_{i,t-1} + \underset{(4.29)}{0.245} c_{i,t-1} + \underset{(4.81)}{0.000203} b_{i,t-1}^2 \\ + \underset{(2.98)}{0.00793} c_{i,t-1}^2 - \underset{(10.18)}{0.00636} c_{i,t-1} b_{i,t-1} + e_{it} \quad R^2 = 0.82$$

$R_{it}$  = 10-year yield for country  $i$  year  $t$

$b_{i,t-1}$  = previous year's debt/GDP

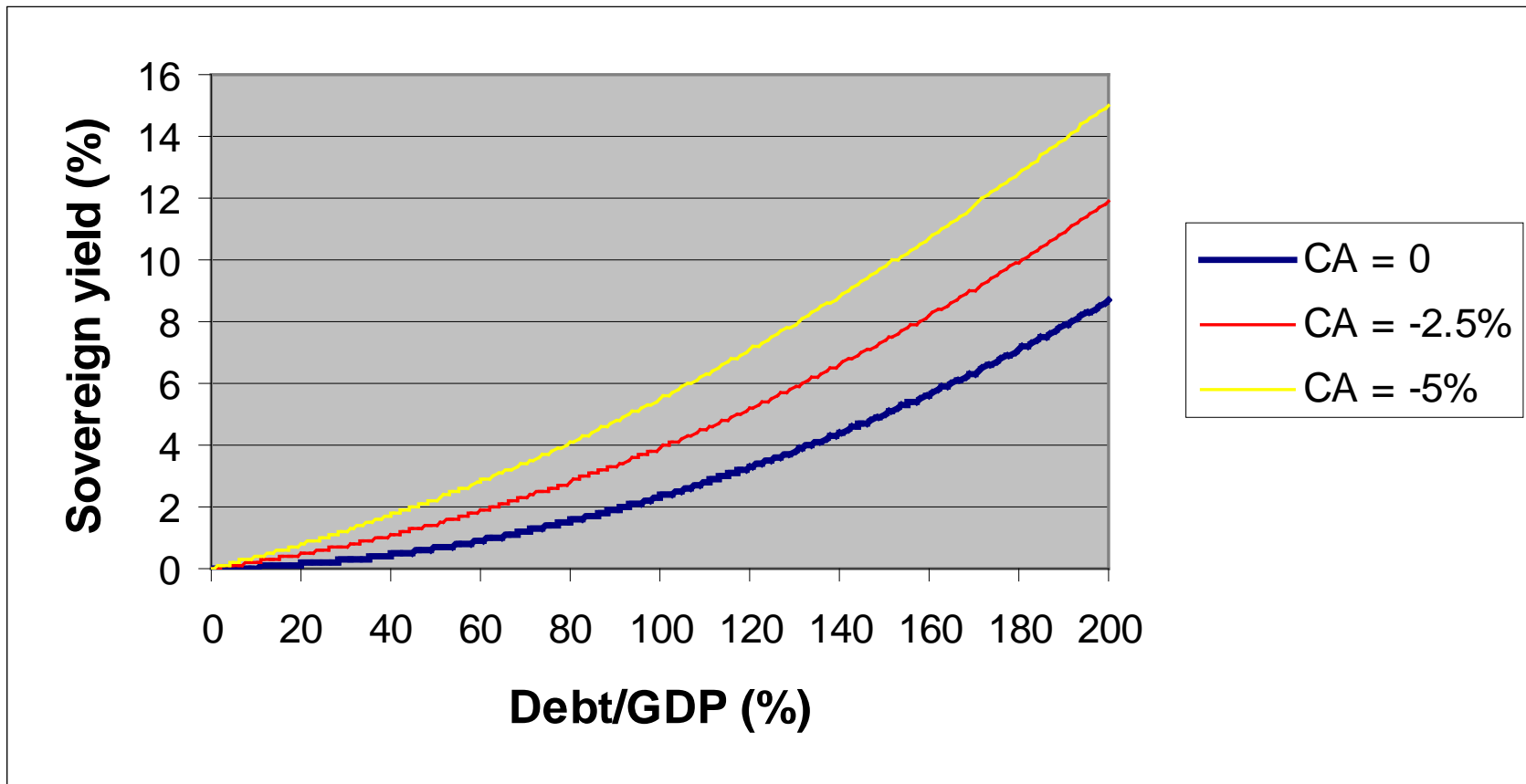
$c_{i,t-1}$  = previous 5 years' average current account surplus

$t$  statistics in parentheses

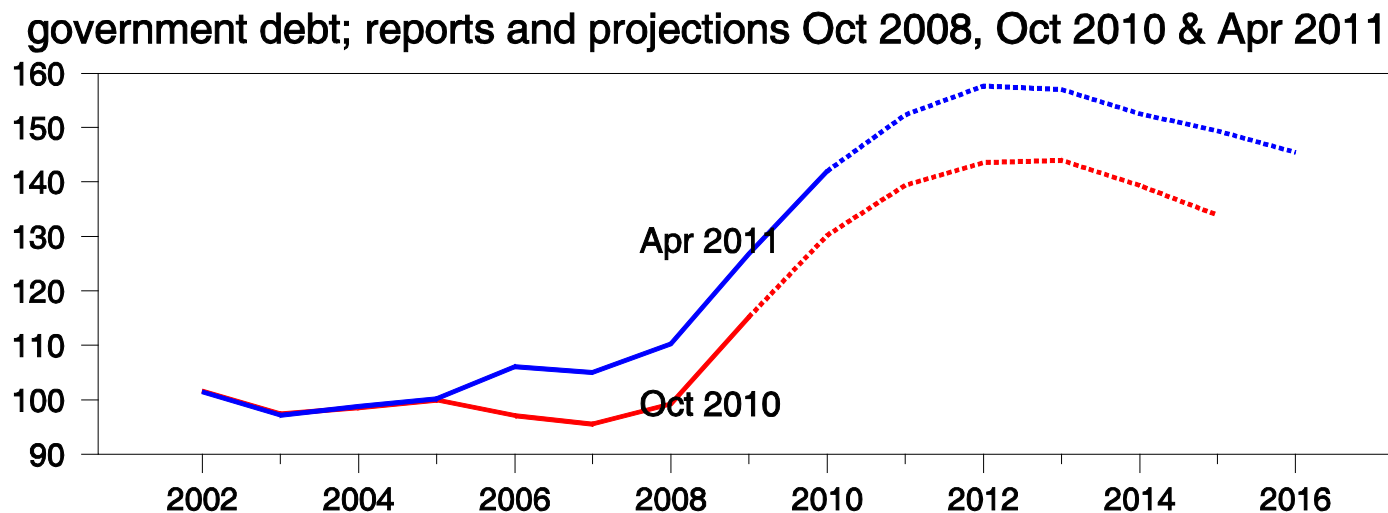
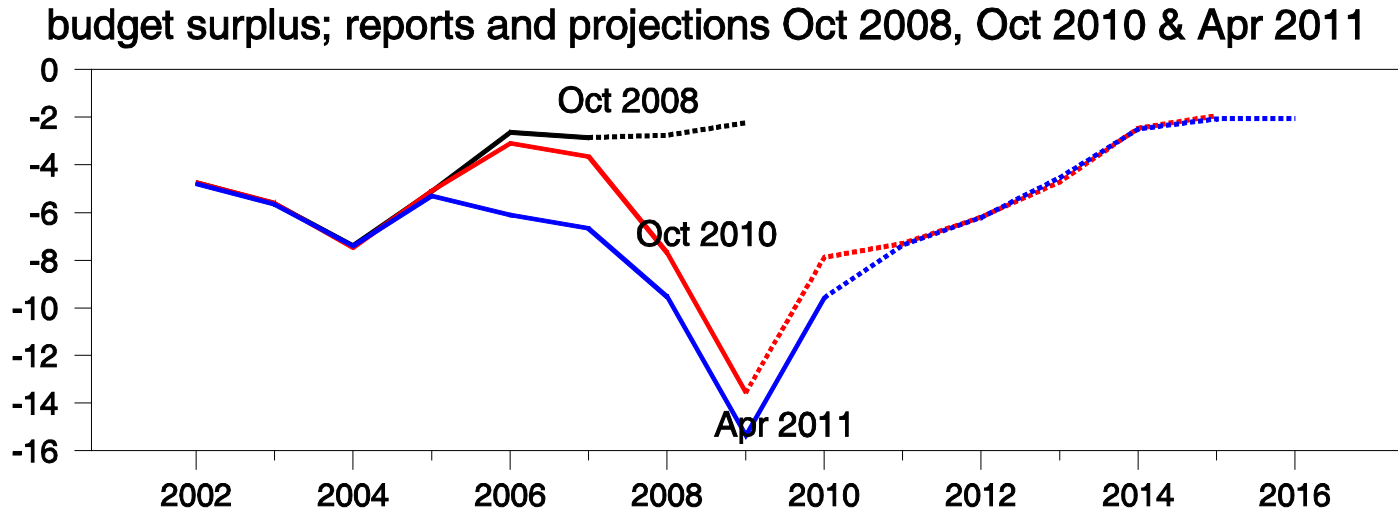
Example: if  $c = 0$  and  $b = 60\%$ , a one percentage-point increase in  $b$  leads to 3 bp increase in 10-year yield



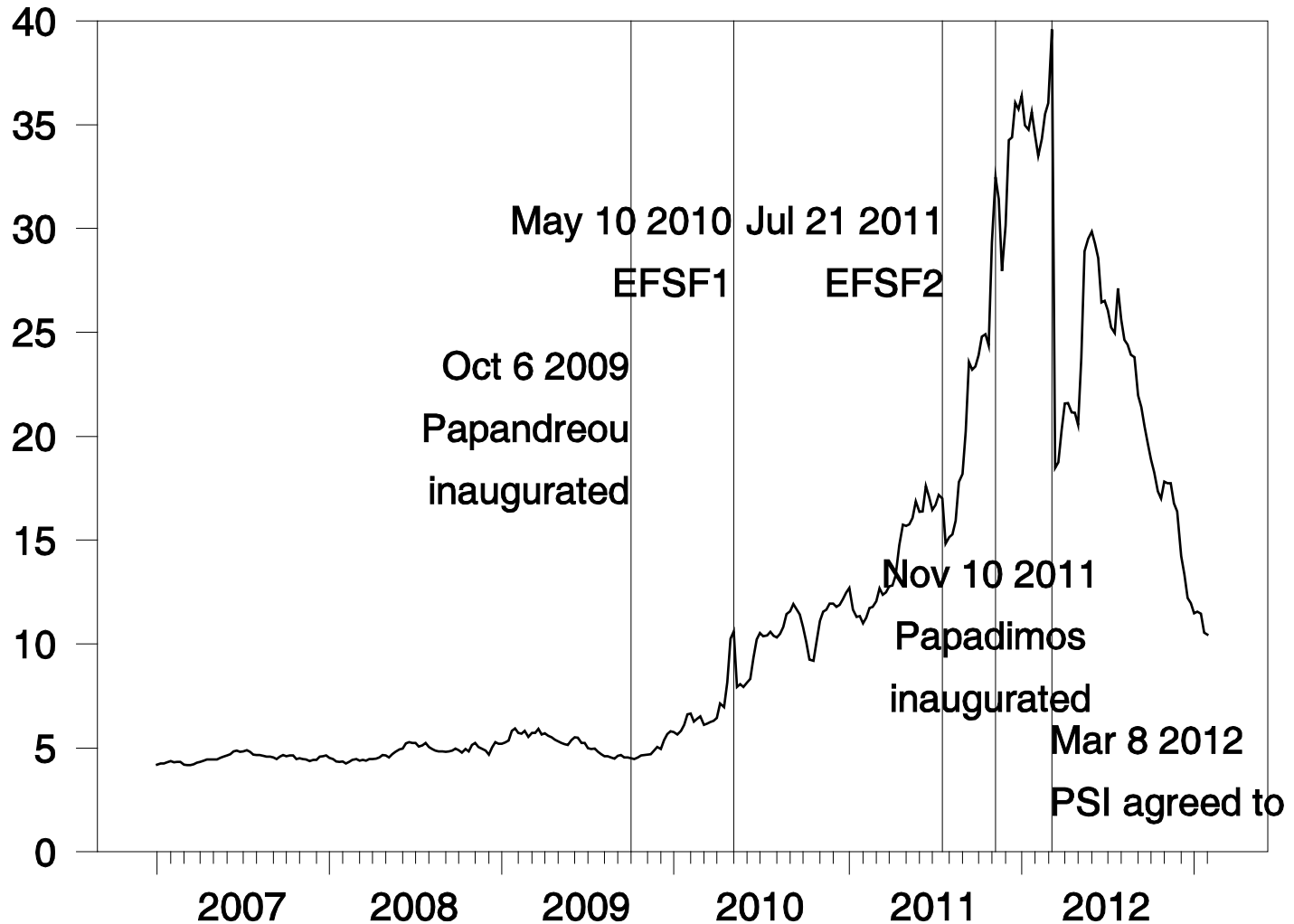
# Change in interest rate associated with higher debt and CA balances



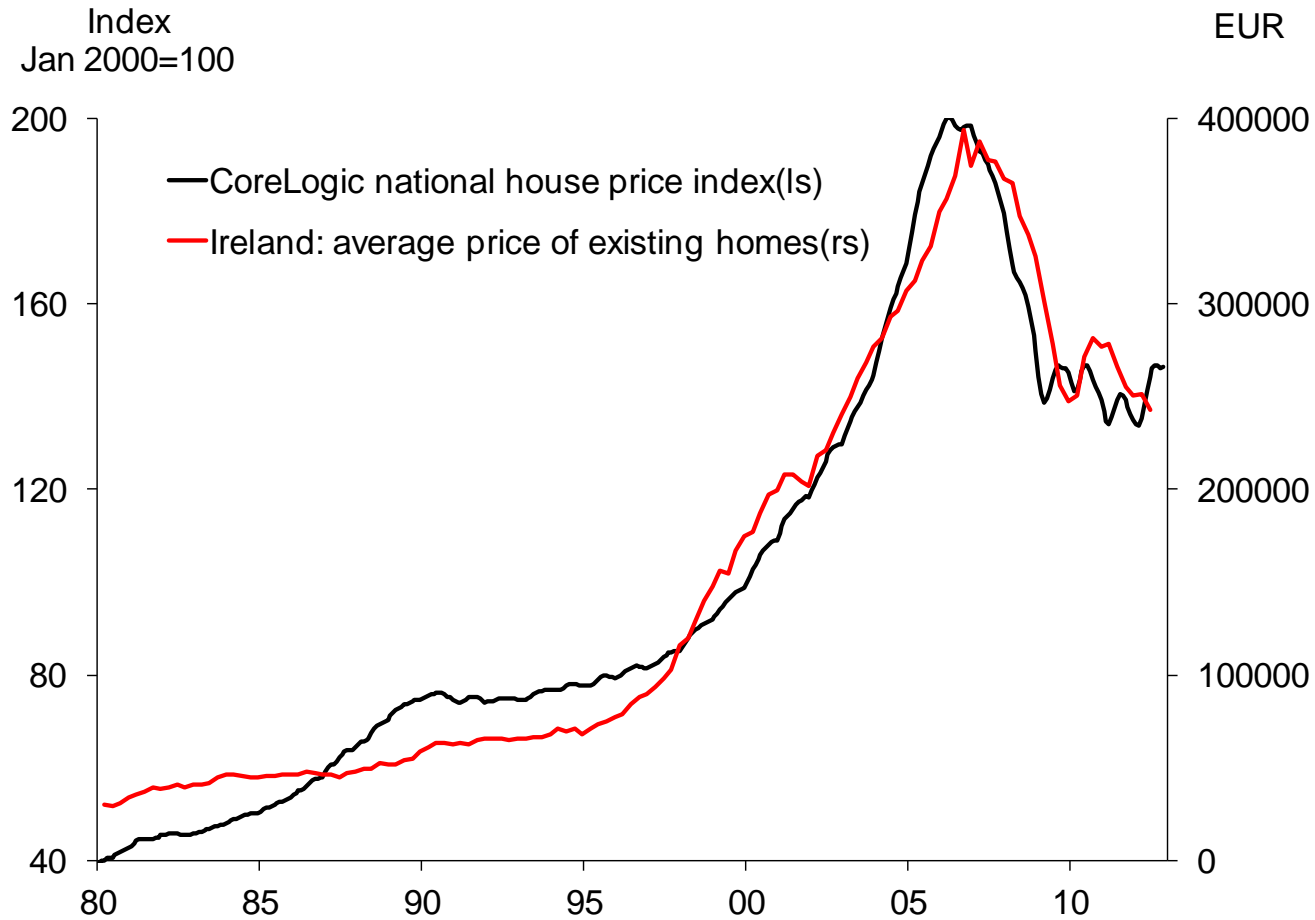
# Greece in 2008: debt/GDP = 100%, $R = 5\%$ , $g = 6.6\%$



# One measure that actually helped Greece was PSI default

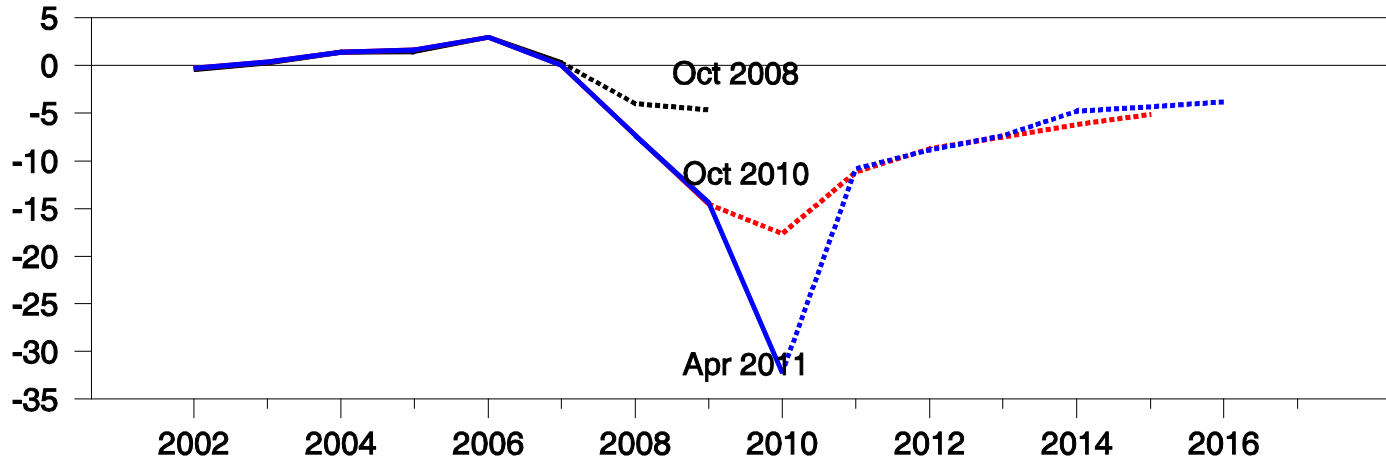


# Case study: Ireland

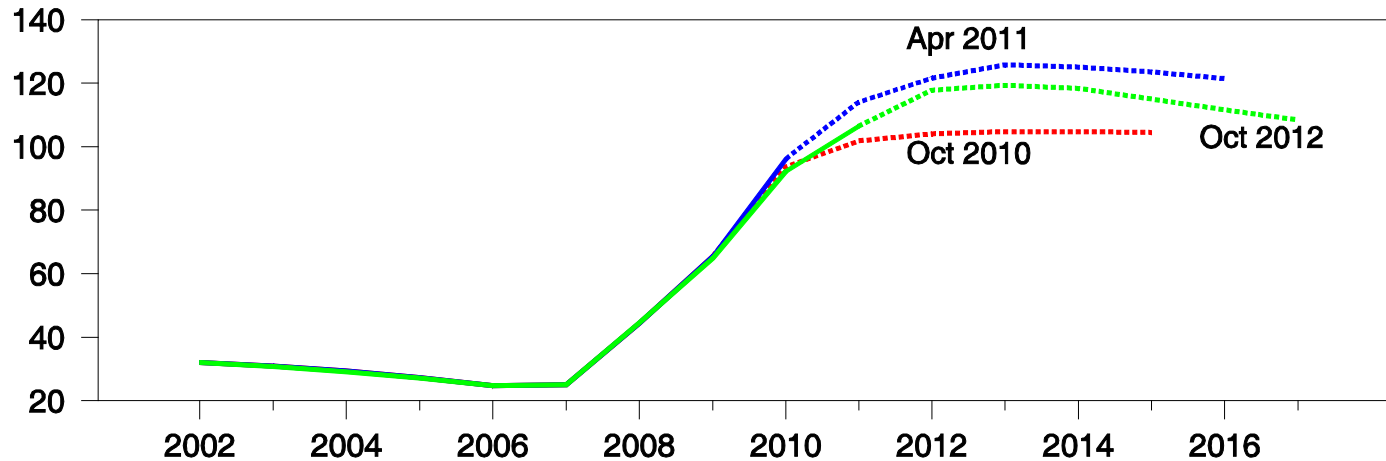


# Nationalizing banking losses pushed Ireland into tipping point

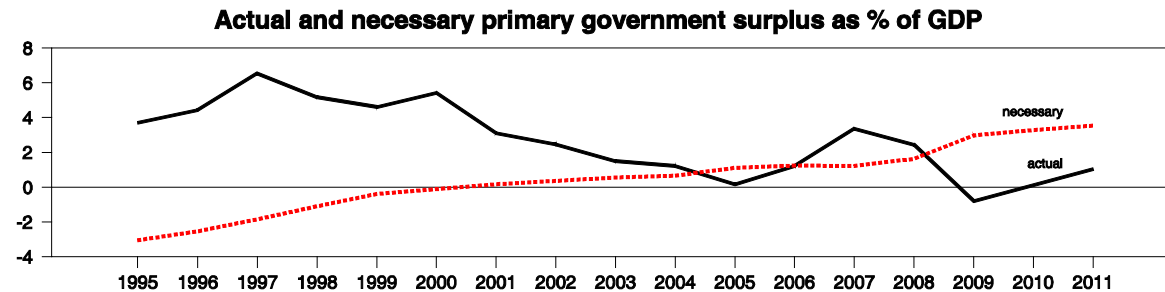
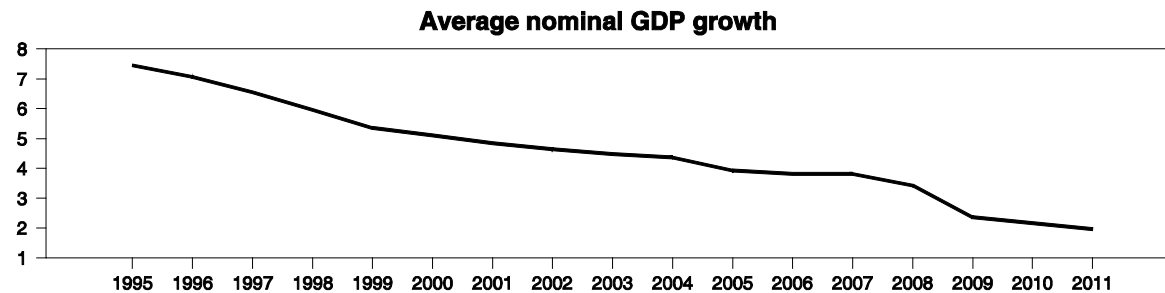
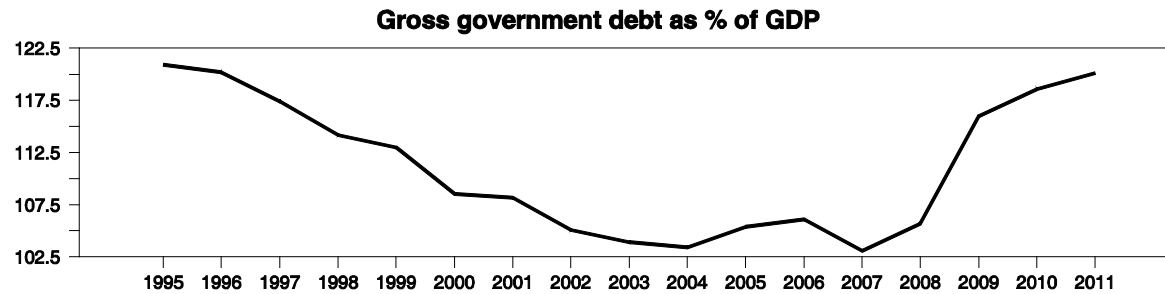
## General government budget balance



## General government debt



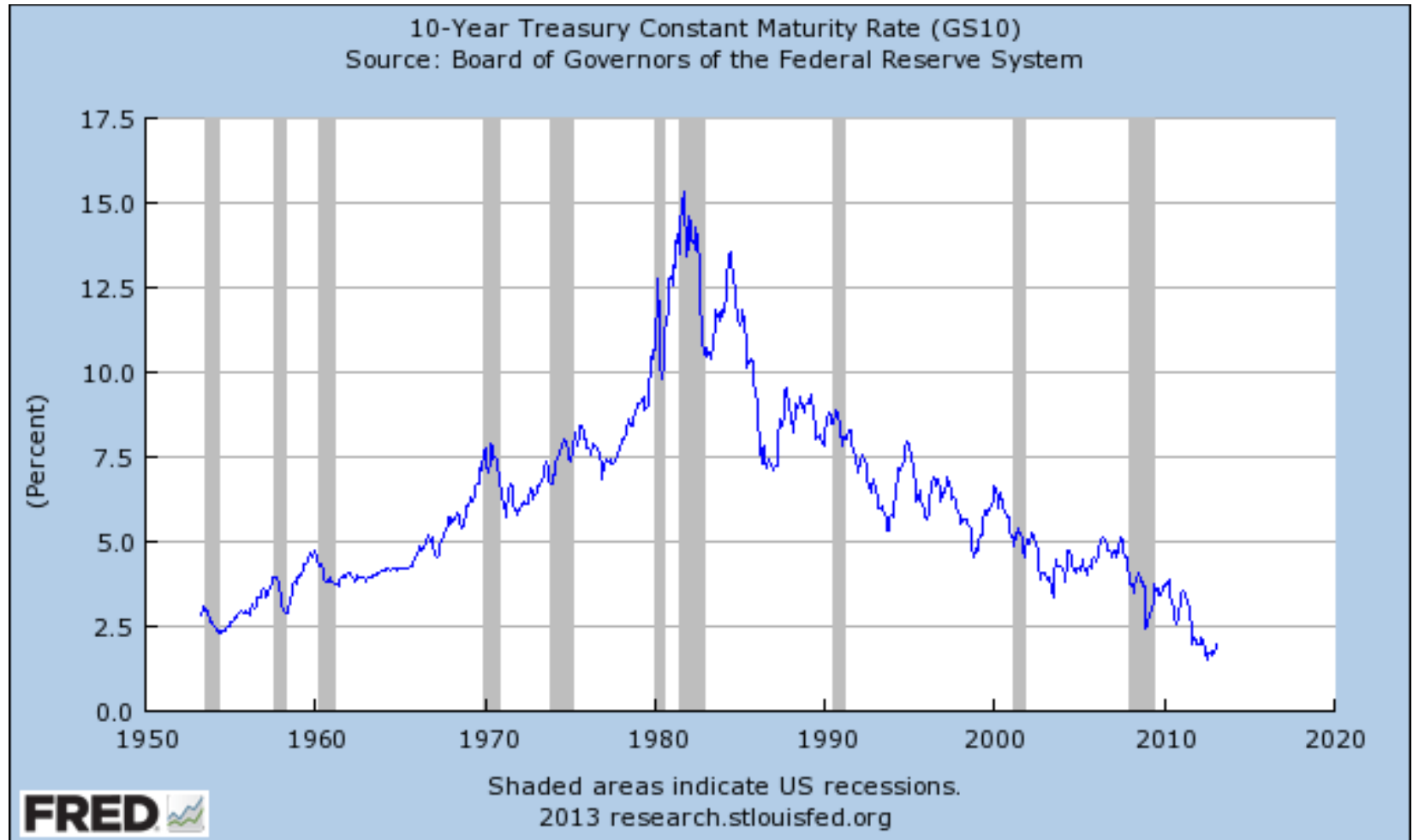
# Italy's growth made 120% debt sustainable in 1995 but not today



# Why is Japanese yield still so low?

- Our regression: favorable country fixed effect and large current-account surplus
- Why is Japan special? High domestic saving rate and extreme home bias
- Hoshi and Ito (2013): Japan's declining saving rate could force it to turn to international lenders
- Conclusion: Japan may face big challenges in future

# United States federal government net interest expense is currently 1.4% of GDP

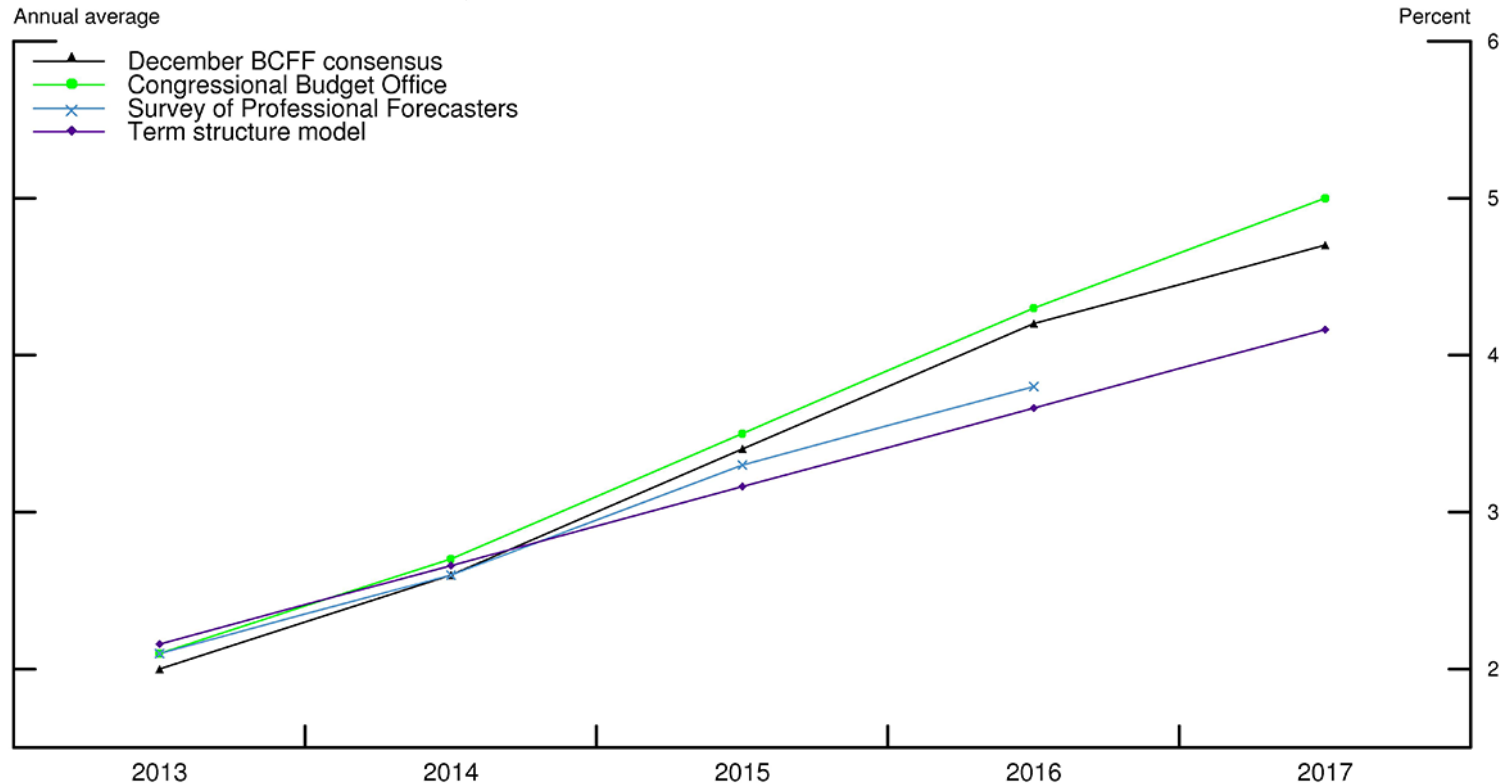




# But interest rates expected to rise

Chart 4. Alternative 10-Year Treasury Yield Forecasts

Annual average

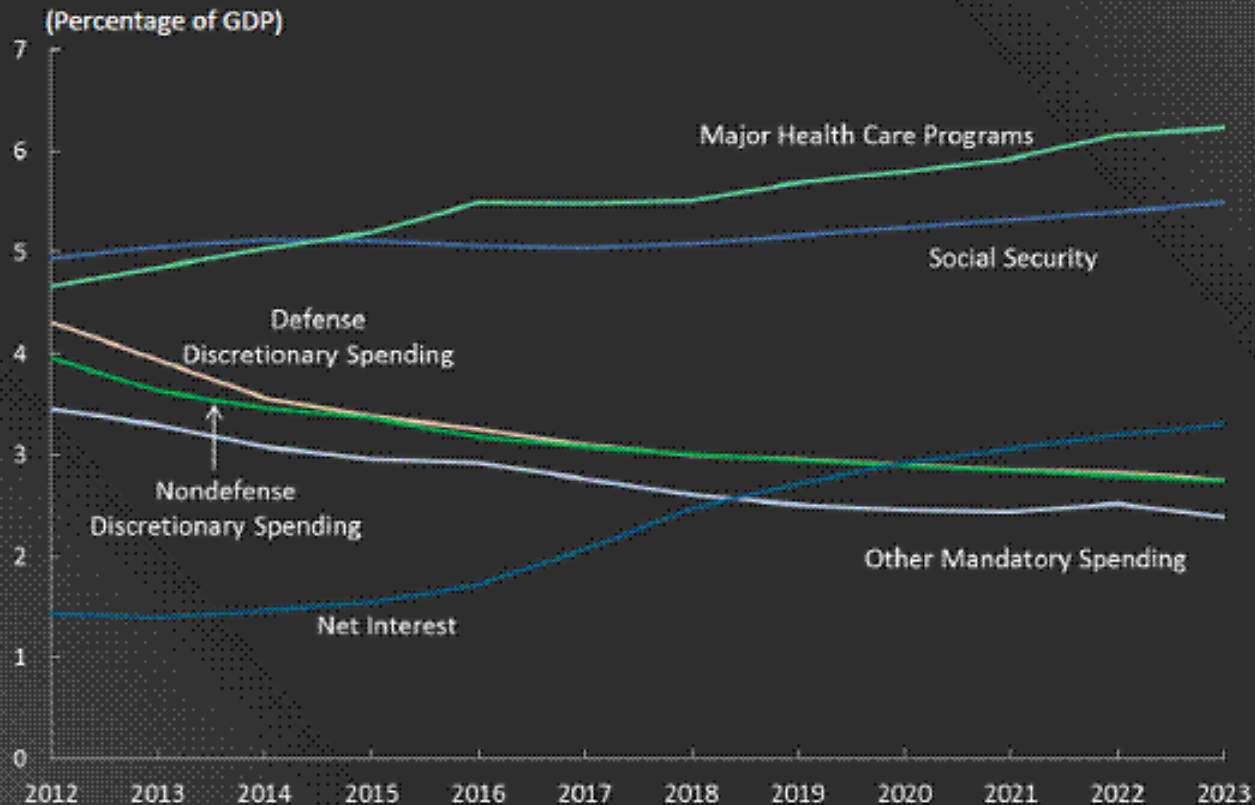


Note: The term structure model forecast assumes that the expected real rate and term premium components of the 10-year nominal yield as shown in chart 2 revert to their respective pre-crisis means over a 5-year period while the expected inflation component remains constant at the level at the end of 2012.

Source: For December BCFF consensus, Blue Chip Financial Forecasts (BCFF) survey, December 2012; for Congressional Budget Office, Congressional Budget Office (2013), *The Budget and Economic Outlook: Fiscal Years 2013 to 2023* (Washington: CBO), February 5; for Survey of Professional Forecasters, Survey of Professional Forecasters for 2013:Q1.

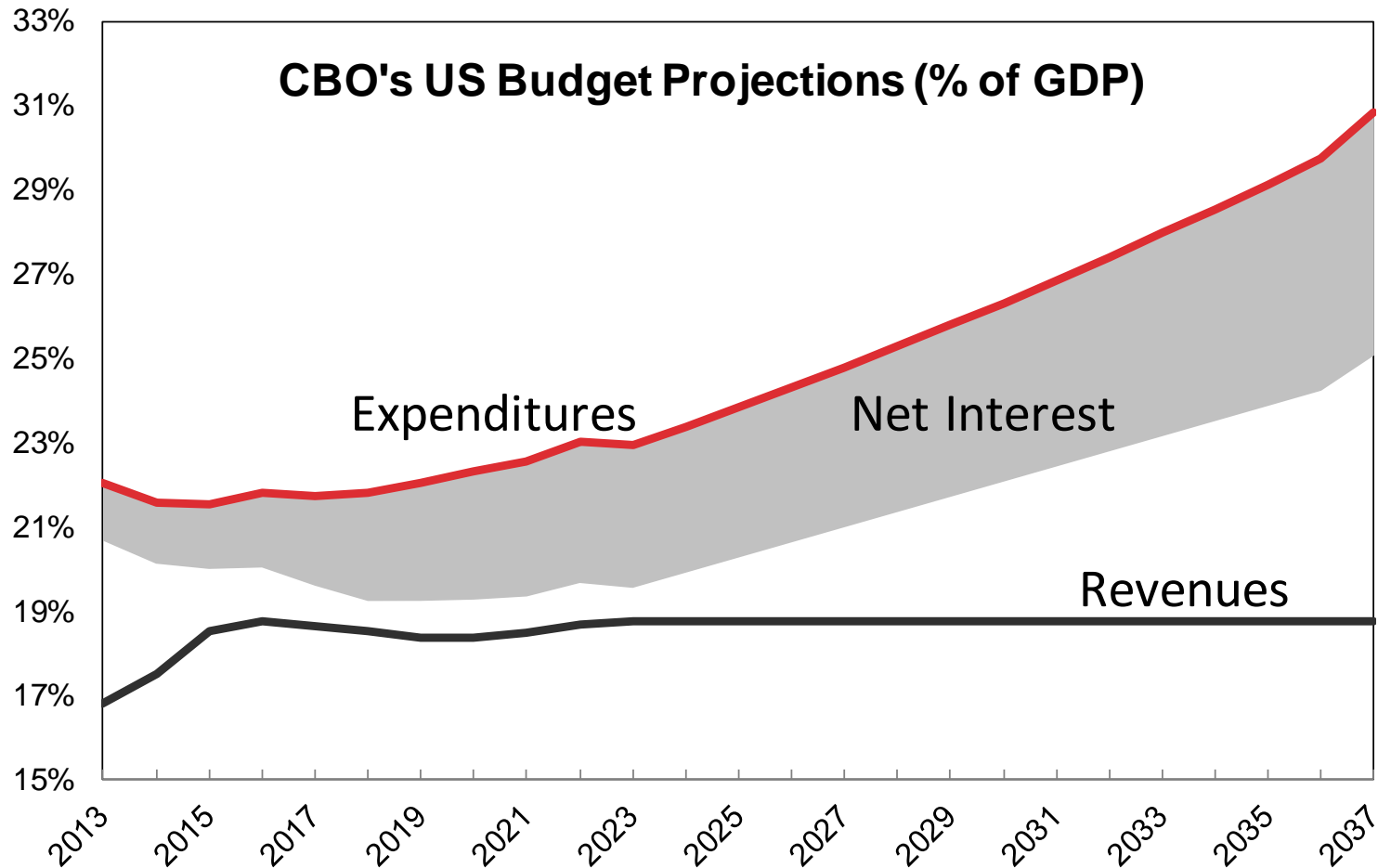
# CBO projects interest expense will exceed defense budget by 2020

## Projected Growth in Major Federal Spending Categories

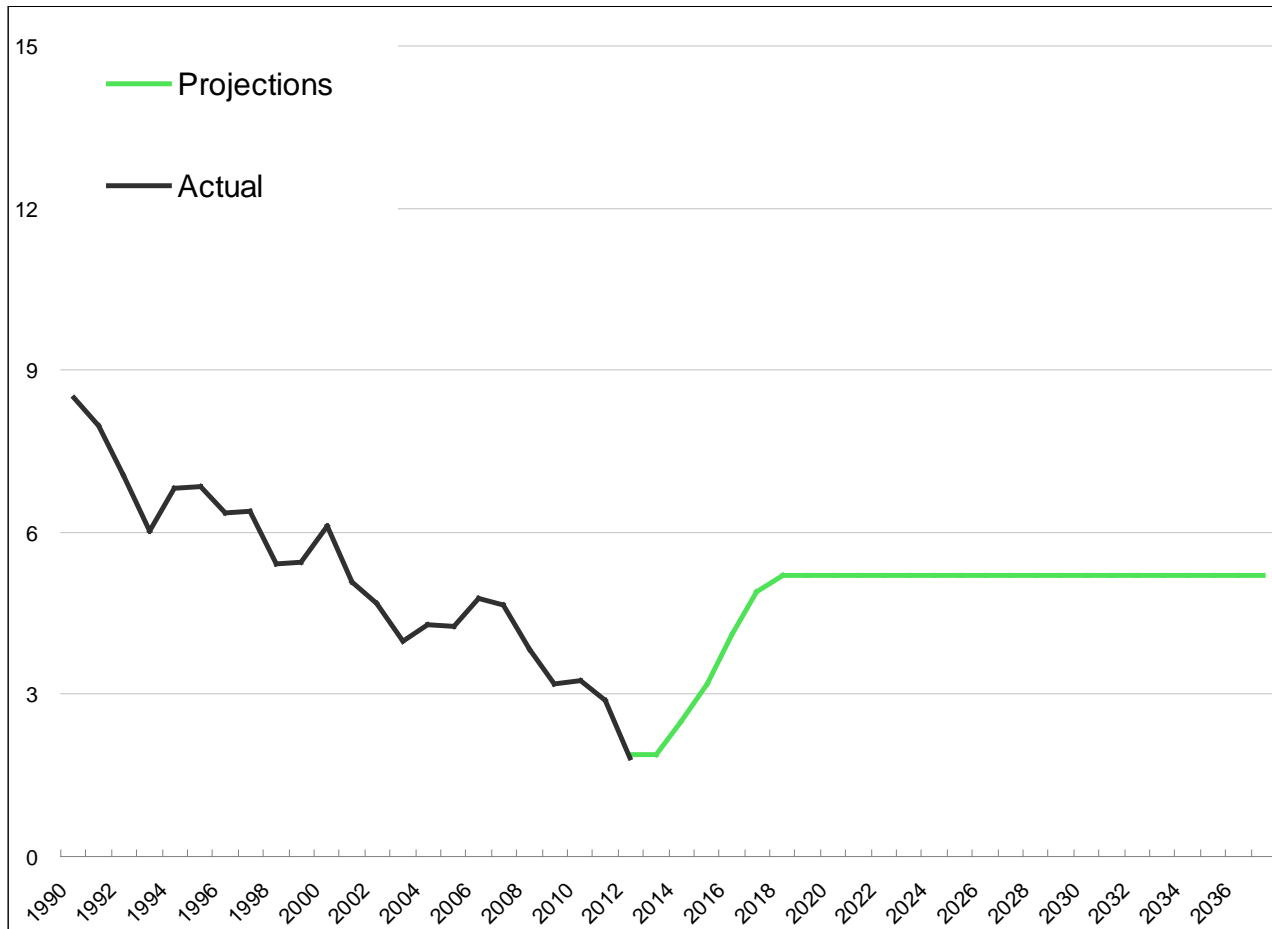


Estimates from *The Budget and Economic Outlook: Fiscal Years 2013 to 2023* (February 2013).

Methodology similar to CBO's previous long-term projections suggests problem just gets worse

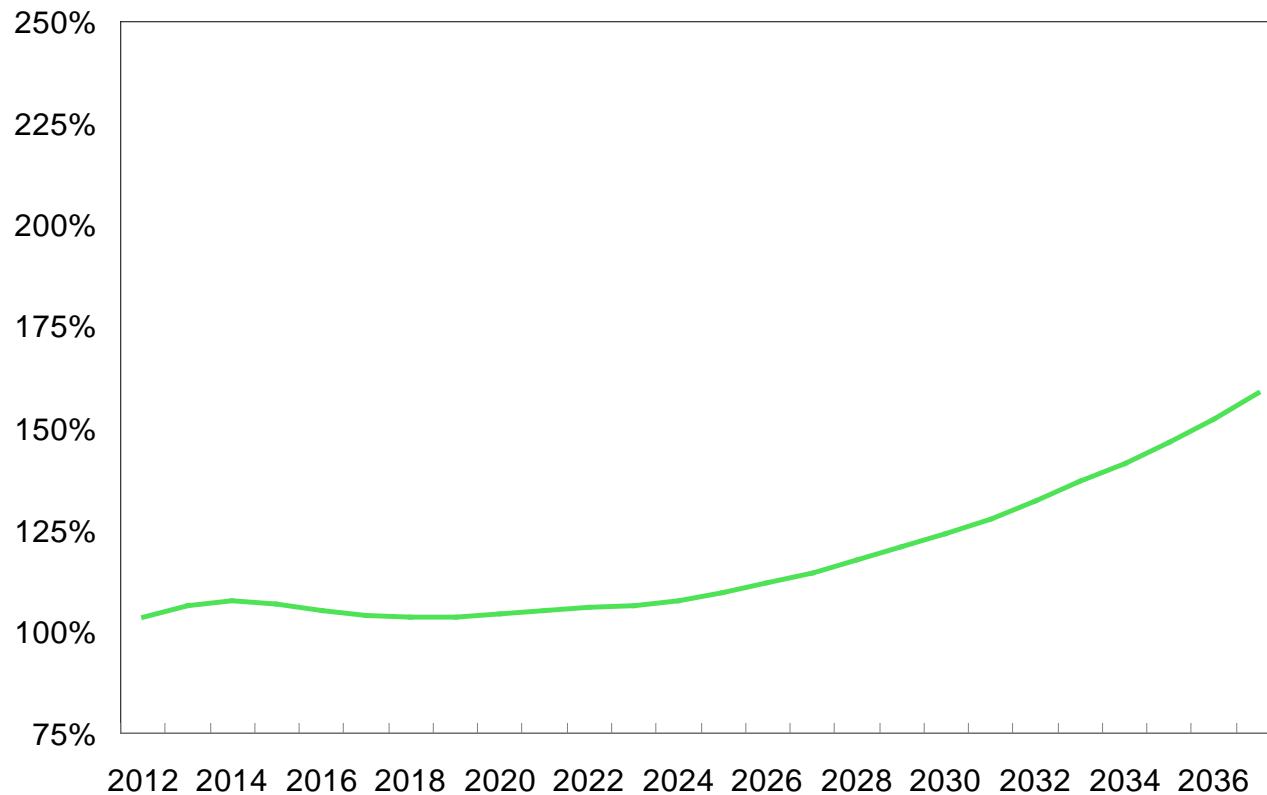


# 10-year Treasury rate assumed in previous simulation

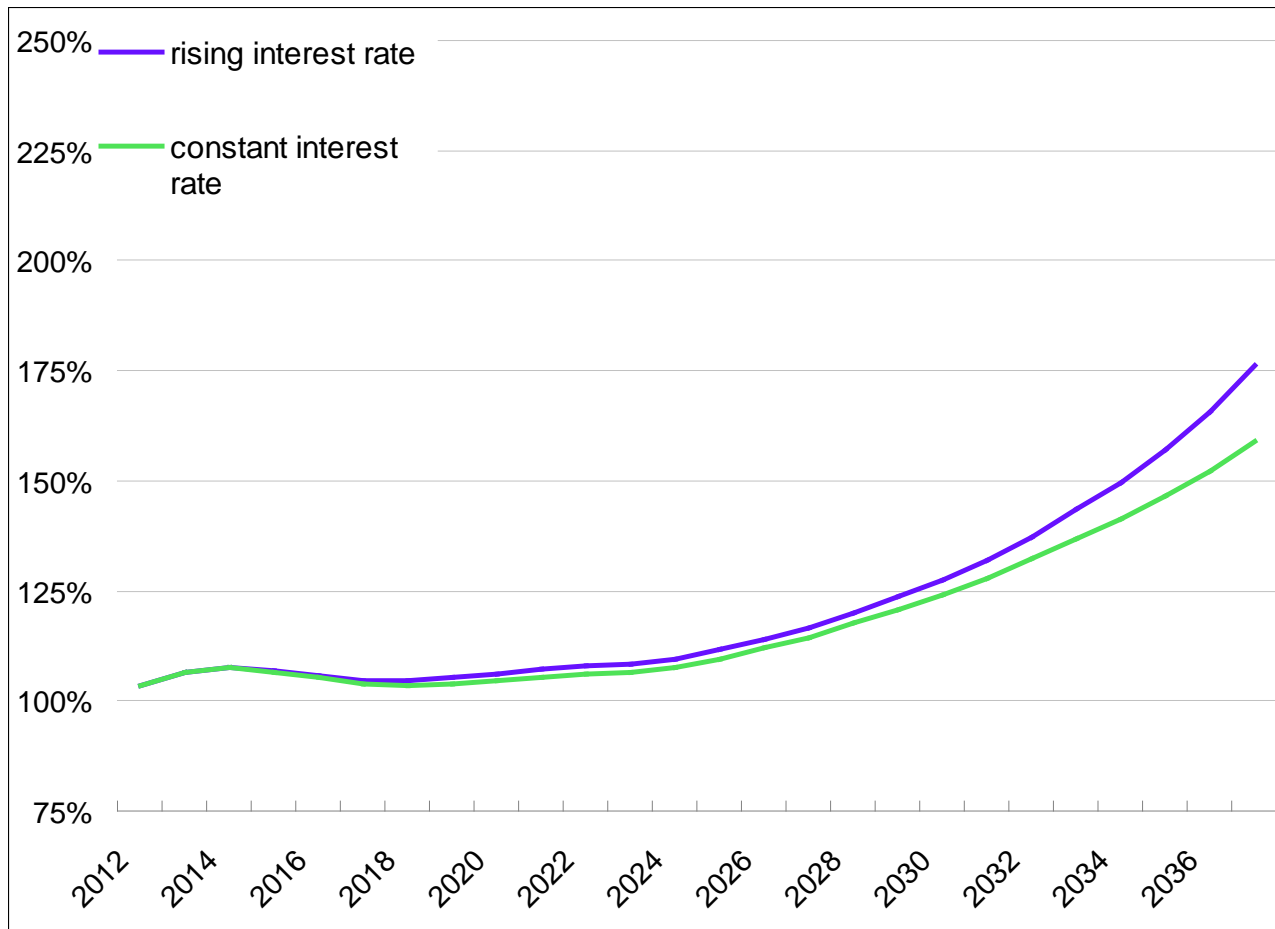


# Gross debt/GDP assumed in previous simulation

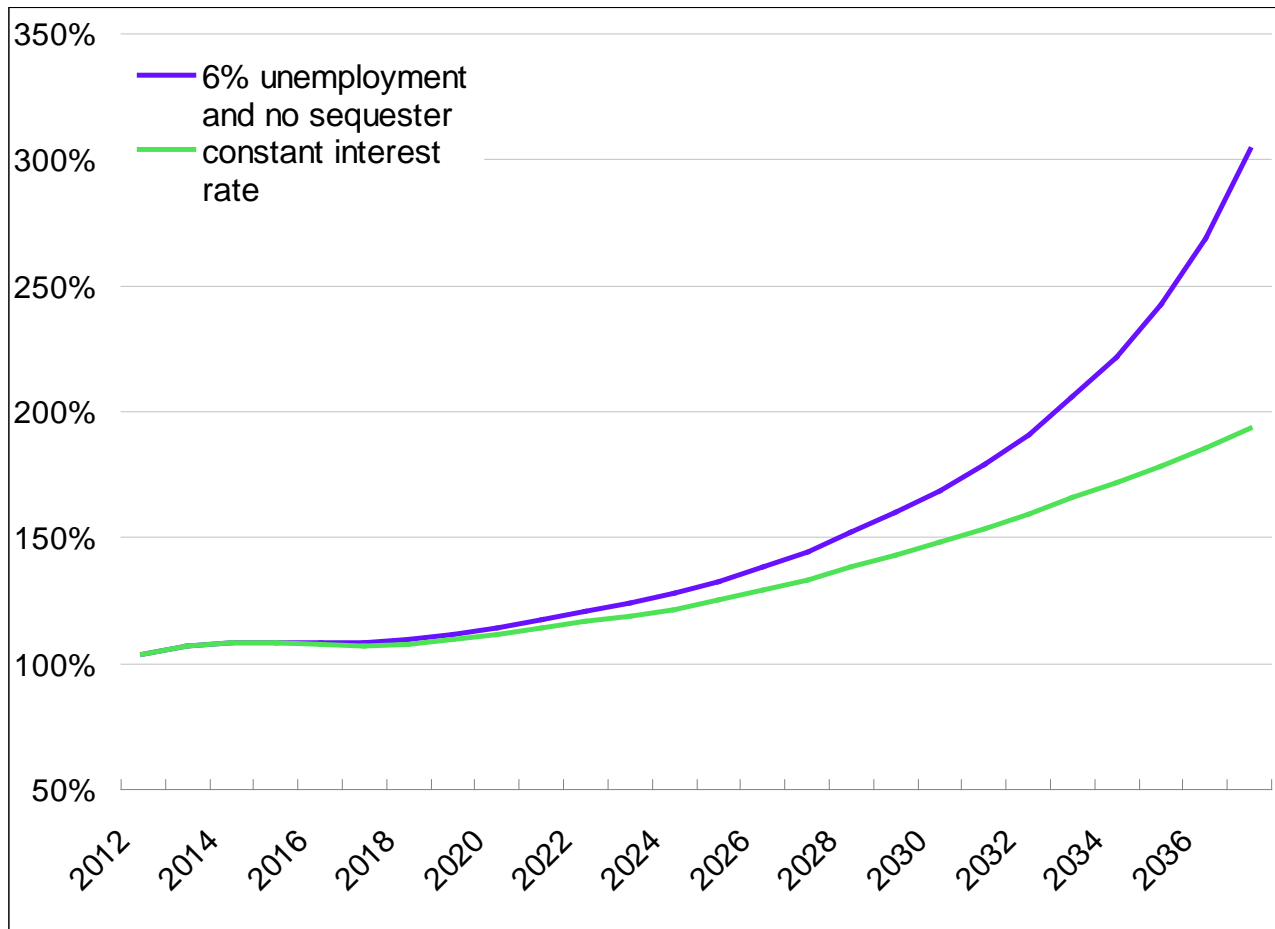
Gross Debt to GDP, Percent



# Gross debt with feedback to interest rate



# Gross debt with sequester cancelled and 6% steady-state unemployment



# What can central banks do about this?

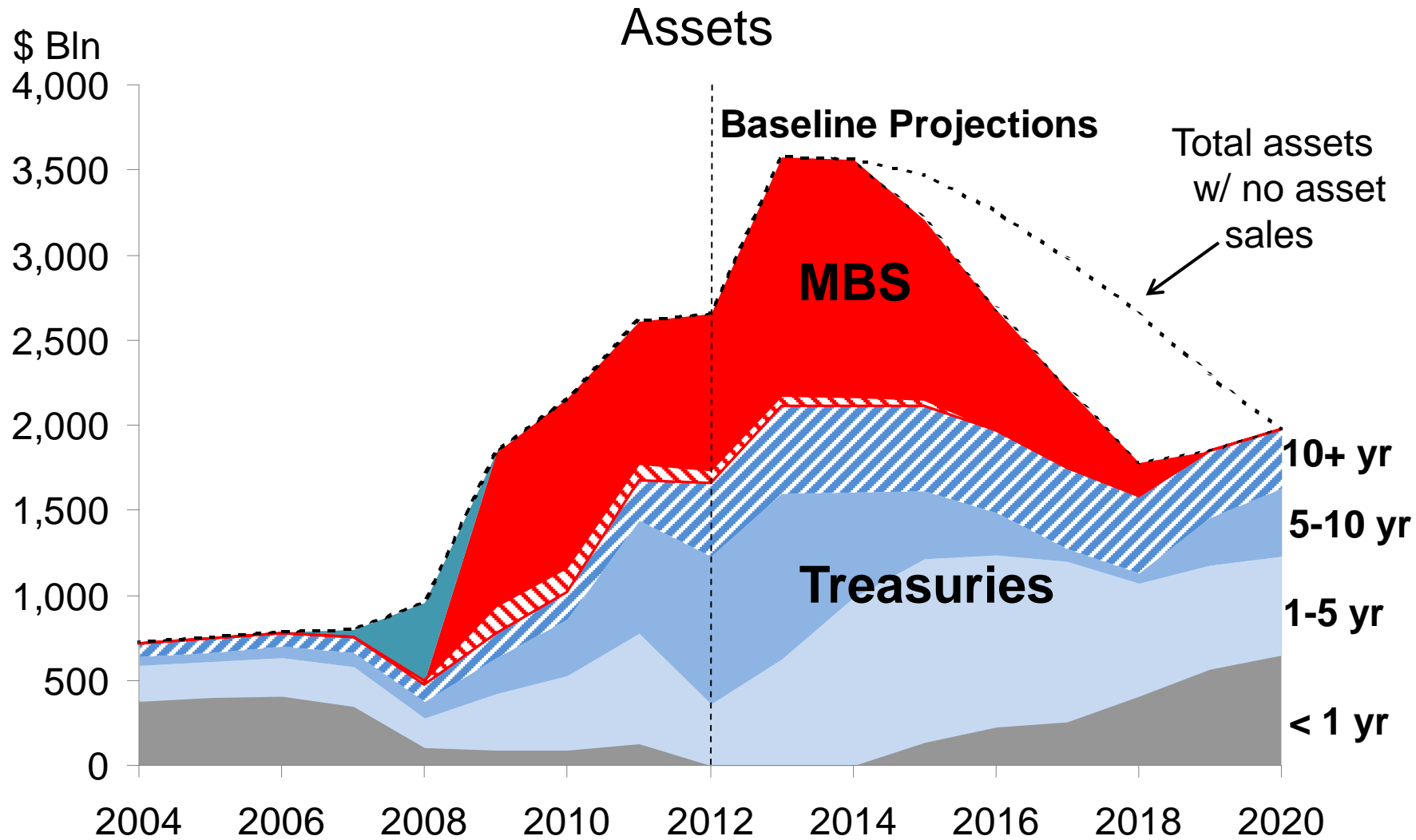
- Central bank *can* use monetary ease to offset contractionary fiscal policy to make successful reform more likely
- Central bank *cannot* bring sustainability to an otherwise unsustainable fiscal policy
- Replacing long-term Treasury debt with interest-paying reserves shortens maturity structure of combined Treasury-Fed balance sheet
- Shorter maturity structure makes countries *more* vulnerable to tipping-point dynamics



- Not a matter of central bank credibility-- Fed has no good options if Treasury auction undersubscribed
- Mechanical question: what would consequences of higher interest rates be for Fed's balance sheet?
- Analyzed independently by Carpenter, Ihrig, Klee, Boote, and Quinn (2013)

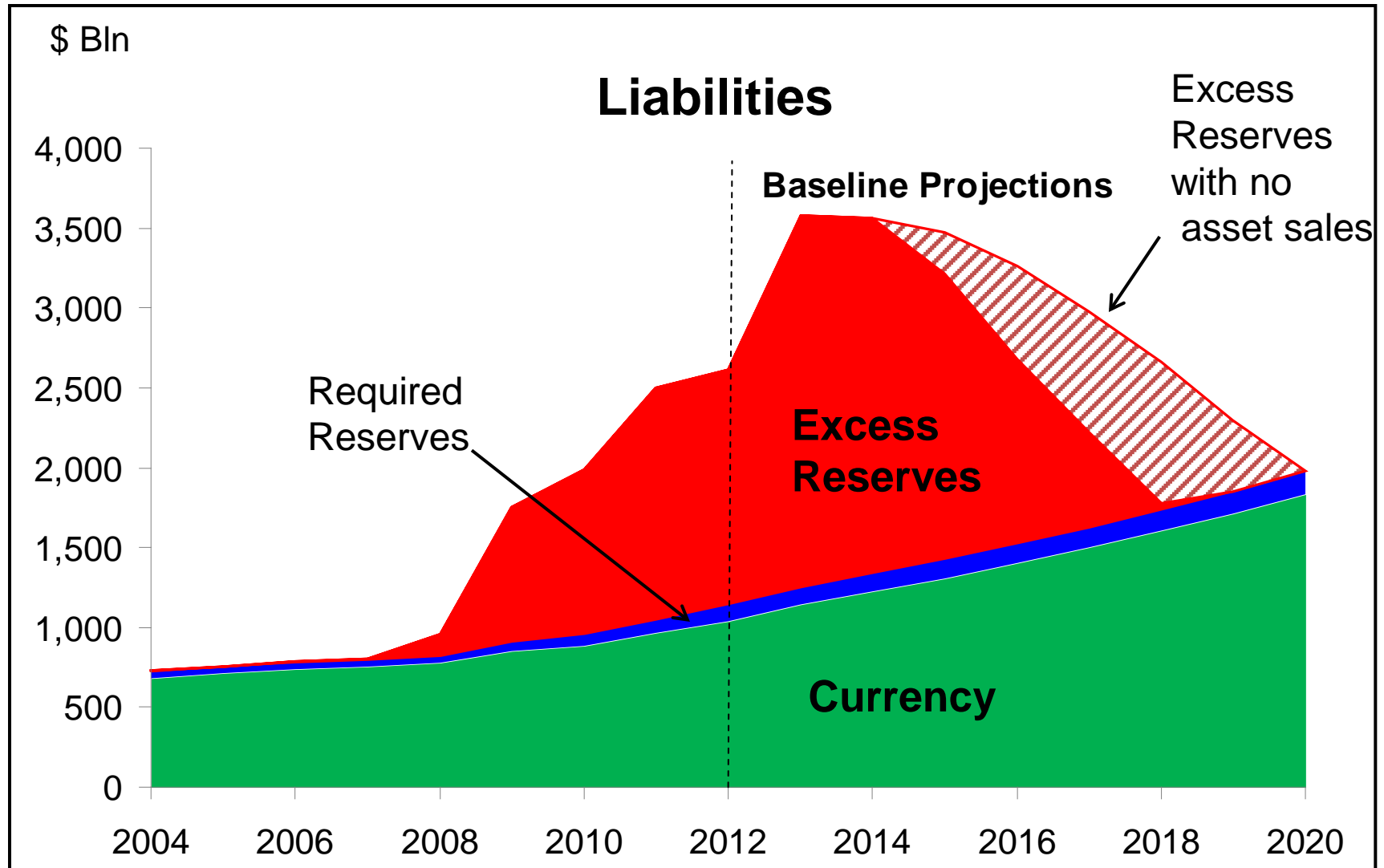
Variable	Assumed growth path	
Asset purchases	Continue at current pace through December 2013, slow to maintenance levels (stock stable) through 2014, stop (stock declines) in 2015.	
Asset sales	MBS sales start late 2015, completed in 2019	
MBS prepayment	Follows market models	
Liabilities	Currency grows at 7% AR (2pp above Blue Chip forecast for nominal GDP growth per historical experience); required reserves grow at 4% AR	
Interest rates	Driven by Blue Chip consensus forecast	
Fed capital	Grows at 10% AR per historical average	
Operating expenses	Grow on historical trend	

# Fed Balance Sheet



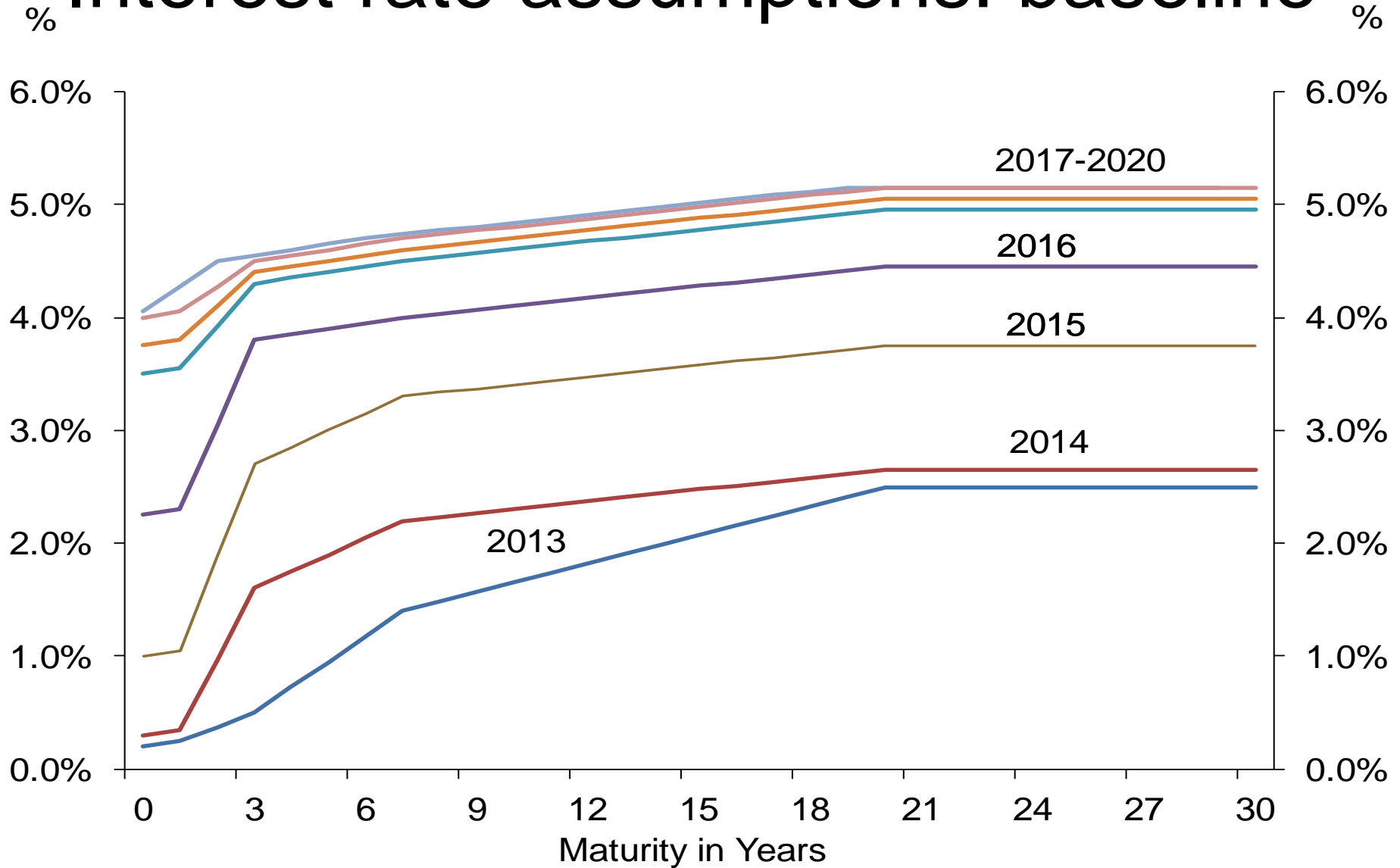
Sources: FRB, Haver Analytics and authors' calculations

# Fed Balance Sheet



Sources: FRB, Haver Analytics and authors' calculations

# Interest rate assumptions: baseline

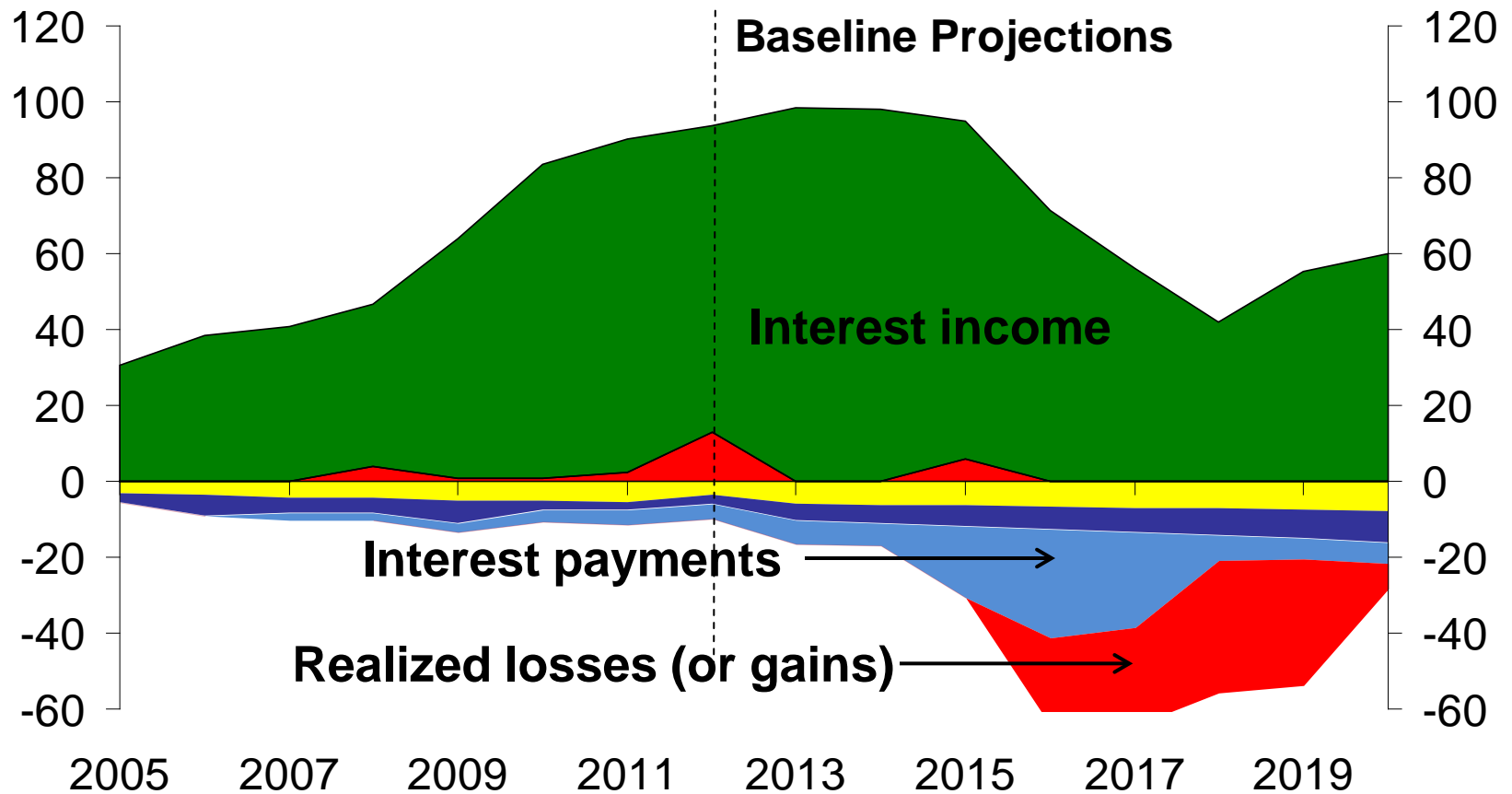


# Fed net income account

\$ Bln

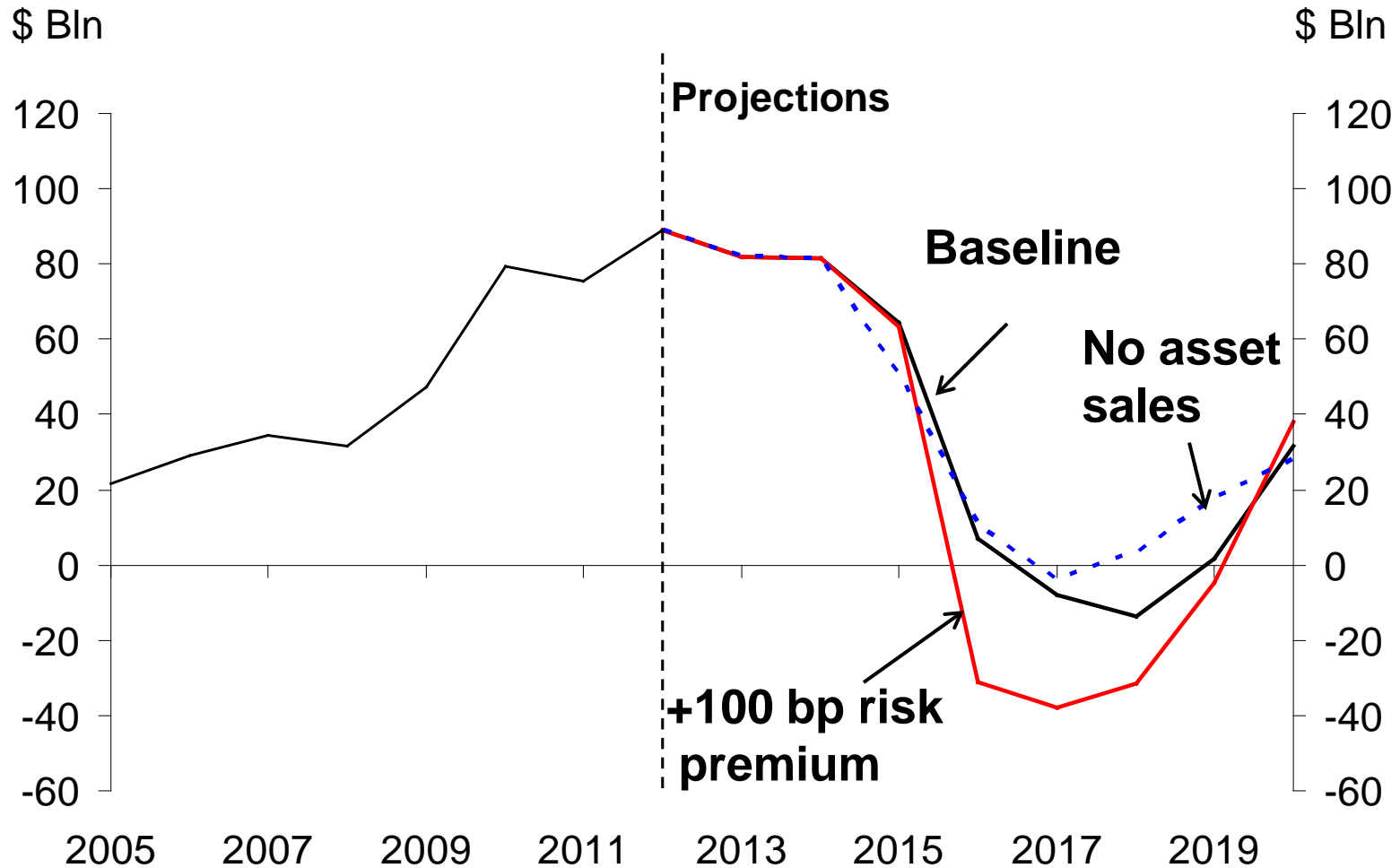
\$ Bln

■ Operating expense ■ Capital surplus plus dividends



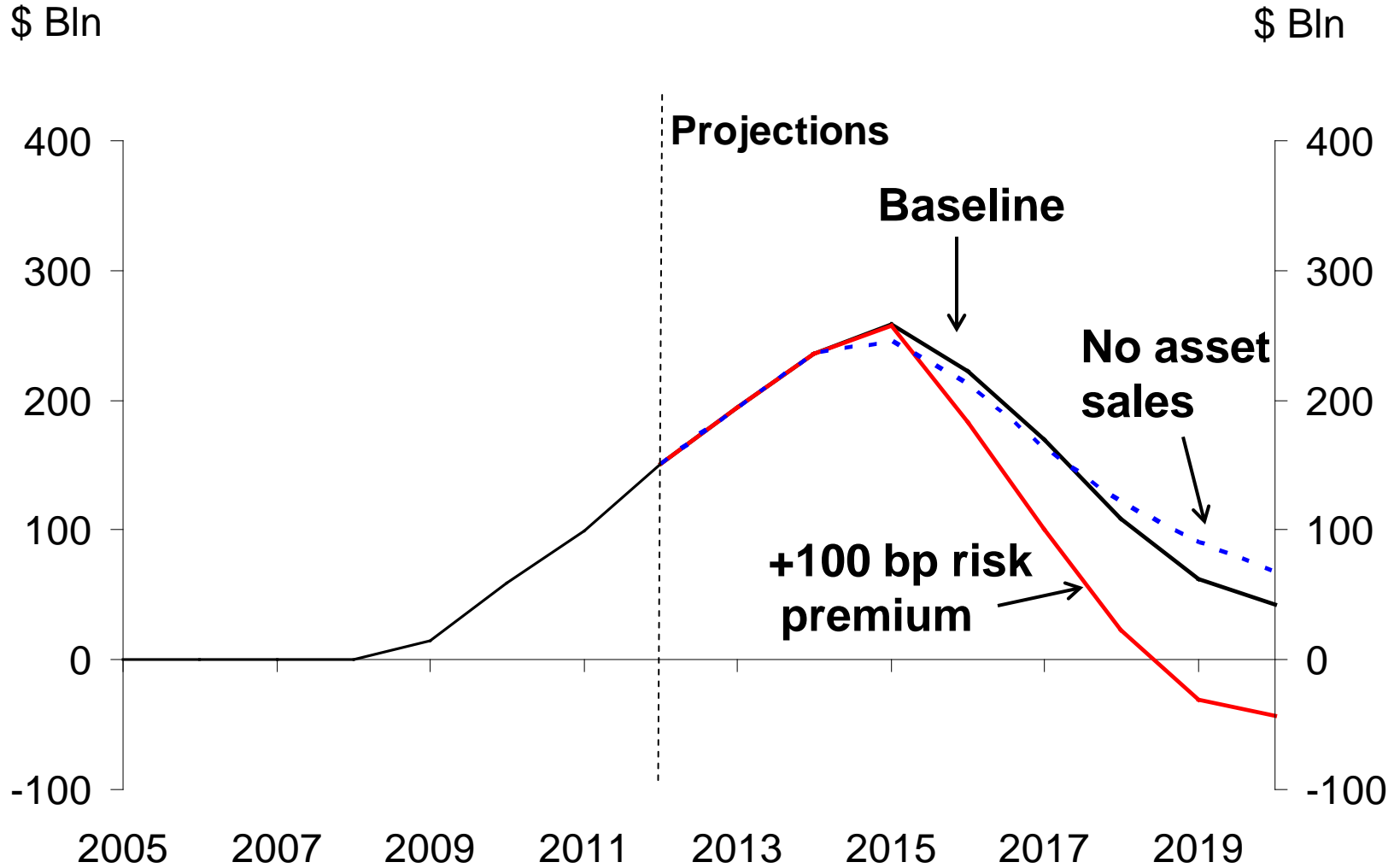
Sources: FRB and authors' calculations

# Net Income Available for Remittance to Treasury



Sources: FRB and authors' calculations

# Cumulative net income relative to pre-crisis trend



Sources: Authors' calculations



# Alternative exit and fiscal shock scenarios

	<b>Peak deferred asset (\$ Bn)</b>	<b>Cumulative excess gain/loss (\$ Bn) 2007-2020</b>
Baseline	22	43
100 bp risk premium begin 2016	105	-43
200 bp risk premium begin 2016	194	-126
200 bp risk premium, no asset sales	67	-18
QE through 2014 at current pace	58	45
QE through 2014, 200 bp risk premium begin 2016	372	-282

*Sources: Authors' calculations*

# Conclusions

- Odds of tipping point rise sharply with debt above 100% and current-account deficit above 2.5%; at these levels, 1% increase in  $b$  increases  $R$  by 6 basis points
- US debt stabilizing near term, but at levels that put it at risk; longer-term US debt still on unsustainable path
- A jump in Treasury risk premium in next five years would complicate Fed exit, resulting in negative income
- Fed credibility undermined and inflation expectations boosted as pressure builds to shift in an easing direction