

A MODELING PERSPECTIVE ON TREASURY DEBT ISSUANCE

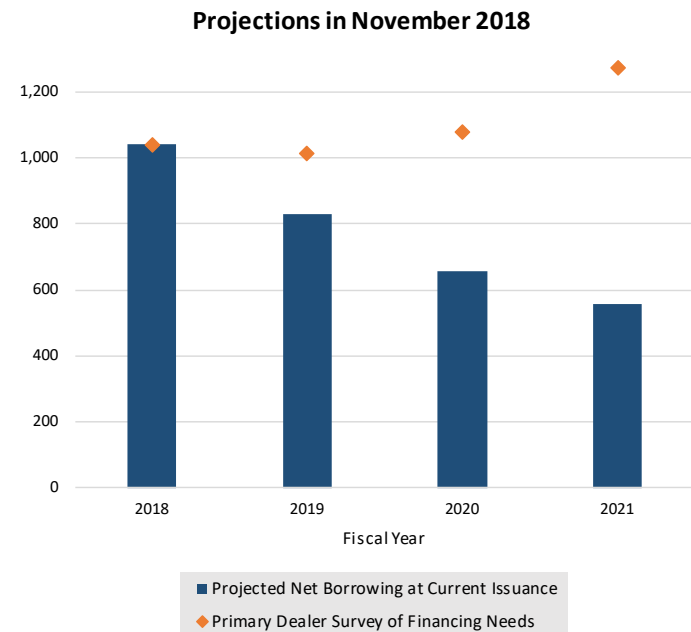
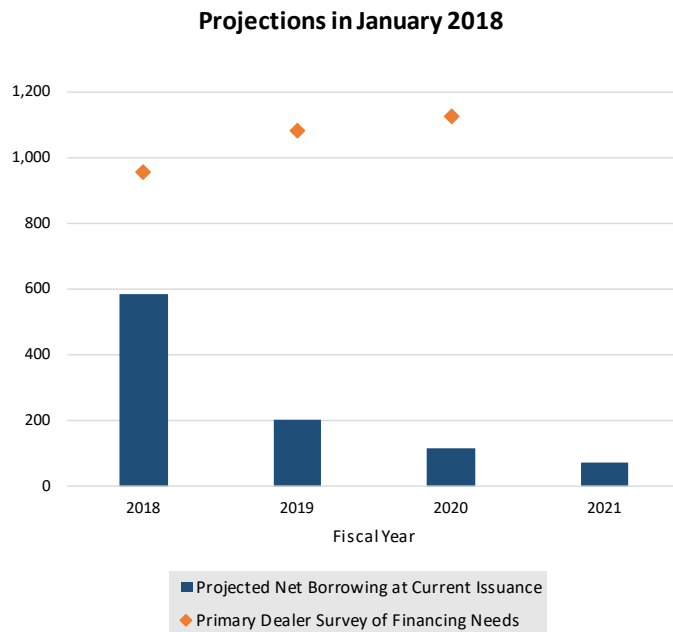
The Evolving Structure of the U.S. Treasury Market:
Fourth Annual Conference

Federal Reserve Bank of New York
December 3, 2018

TREASURY FINANCING NEED PROJECTIONS

- Issuance of Treasury securities had to increase meaningfully in order to meet net borrowing needs over coming years

Projected Net Marketable Borrowing by the Treasury



DEBT MANAGEMENT PRACTICES

- An important priority of debt managers is to achieve the lowest possible borrowing cost over time without creating an unacceptable level of fiscal risk
- Most discussions of the U.S. Treasury's debt management strategy have focused on maintaining "regular and predictable" issuance
- However, the regular-and-predictable approach does not specify the ultimate maturity structure that best serves the U.S. Treasury
- TBAC members have worked towards an analytical framework that can help assess the optimal maturity structure of Treasury debt
- It is important to consider this issue given the substantial increase in borrowing needs in coming years

MODELING EFFORTS BY TBAC MEMBERS

Hutchins Center Working Paper #46

October 2018

Optimizing the Maturity Structure of U.S. Treasury Debt: A Model-Based Framework

Terry Belton

JPMorgan Chase

Huachen Li

JPMorgan Chase

Kristopher Dawsey

The D. E. Shaw Group

Srini Ramaswamy

JPMorgan Chase

David Greenlaw

Morgan Stanley

Brian Sack

The D. E. Shaw Group

MODEL STRUCTURE: ECONOMIC VARIABLES AND INTEREST RATES

The macroeconomic block is a standard three-equation model

- An I/S curve for the unemployment gap
- A Phillips curve for inflation
- A monetary policy rule for the short-term interest rate

The rates block determines Treasury yields across the curve

- Yields embed the expected path of the short-term rate and a term premium (TP) component
- TP based on the Adrian-Crump-Moench model; allowed to respond to macro variables and to have other dynamics
- Other spreads are present (on-the-run premium, bill premium)

A few key features of these parts of the model:

- Macro variables are mean reverting, reflecting effects of Fed policy
- TP has persistent movements but reverts towards historical average
- Steady-state involves an upward-sloping TP
 - 2-year TP of ~0 bps, 10-year TP of ~50 bps

MODEL STRUCTURE: FISCAL POLICY AND TREASURY ISSUANCE

The primary deficit is countercyclical

- Captured with a simple equation tied to the unemployment gap
- Introduces important correlations between financing needs and rates

Treasury issuance is allowed to follow various patterns across maturities

- This version of model incorporates nominal securities at all relevant maturity points from bills to 30-year bonds
- Model keeps track of the outstanding distribution of debt maturities

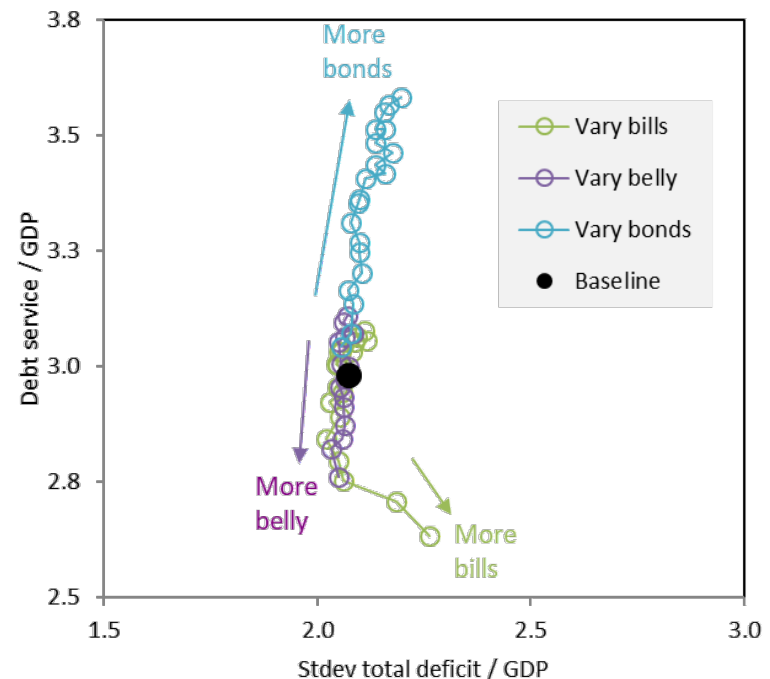
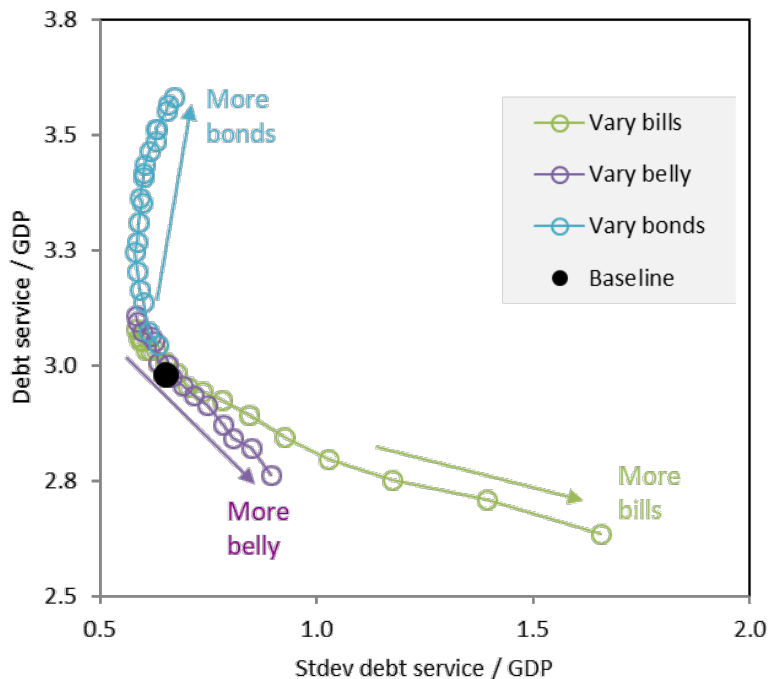
Run simulations to see the distribution of outcomes for funding cost

- Captures uncertainties about funding needs and the interest rate environment faced when having to meet those funding needs
- Can measure debt performance (cost and risk) at a given horizon

RESULTS UNDER STATIC ISSUANCE STRATEGIES

- The model can be used to assess the trade-off between expected funding cost and the variation in funding cost or budget deficit
- Intermediate maturities (especially 2-year to 5-year) perform quite well

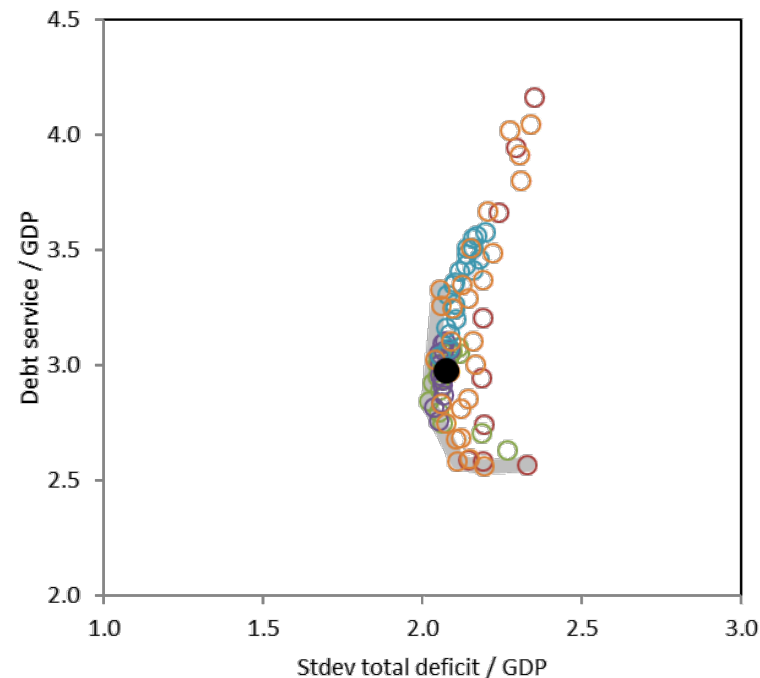
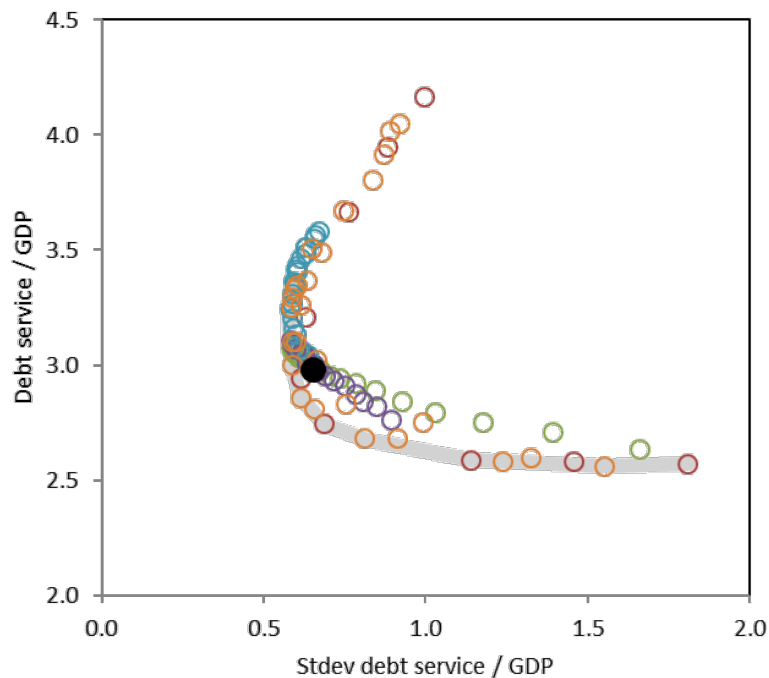
Average debt cost/variability trade-off under two measures (20 years ahead)



POSSIBLE OUTCOMES UNDER STATIC ISSUANCE STRATEGIES

- Can trace out the frontier of possibilities under static issuance strategies
- In these strategies the distribution across maturities does not respond to economic or financial variables

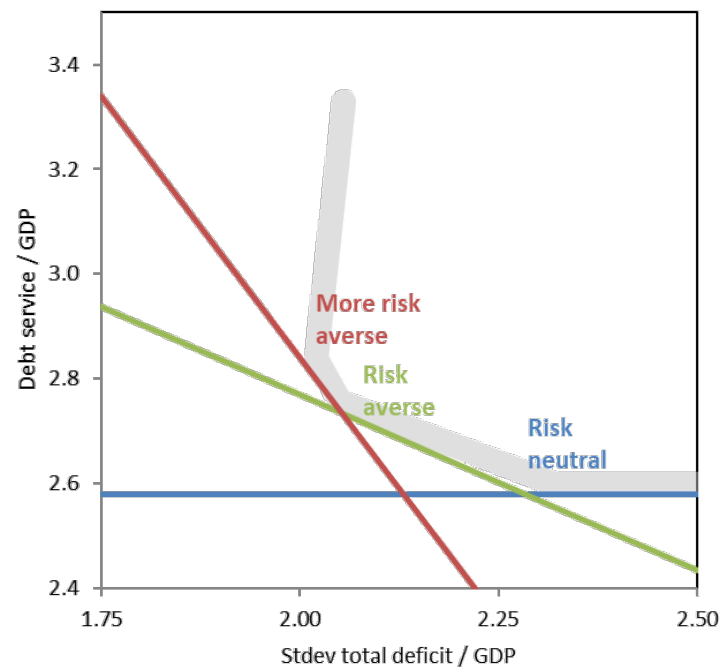
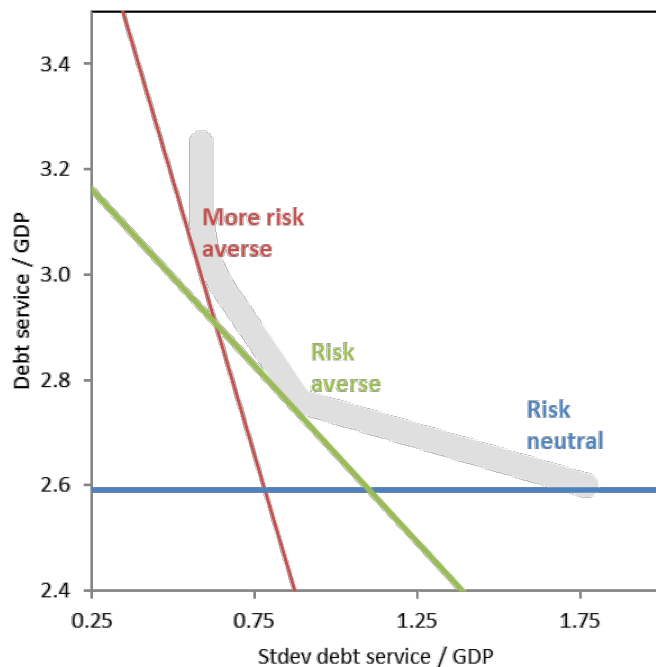
Frontier for average debt cost/variability trade-off (20 years ahead)



OPTIMIZATION BY THE DEBT MANAGER

- Treasury would prefer to reach outcomes as far down and left as possible on the trade-off chart, as represented by indifference curves
- With assumed preferences, can determine the optimal issuance patterns

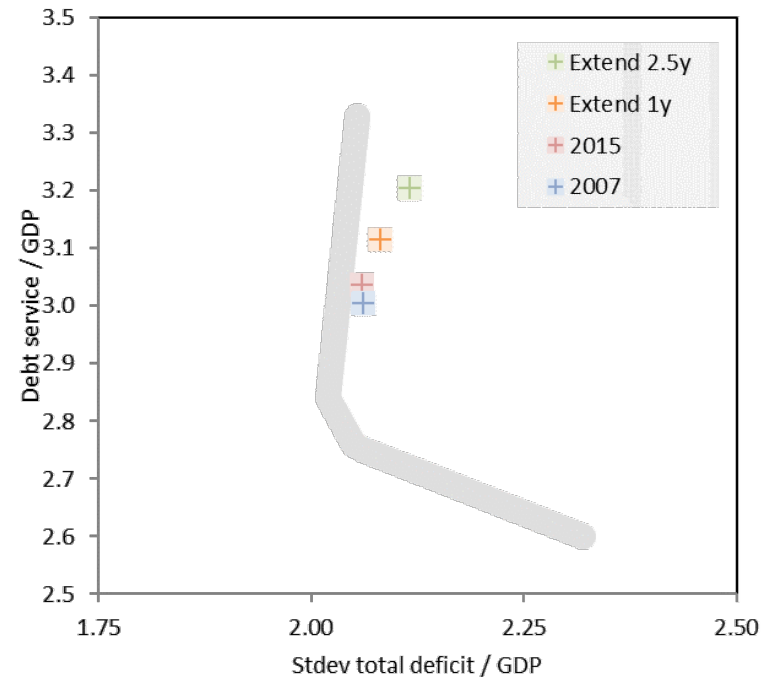
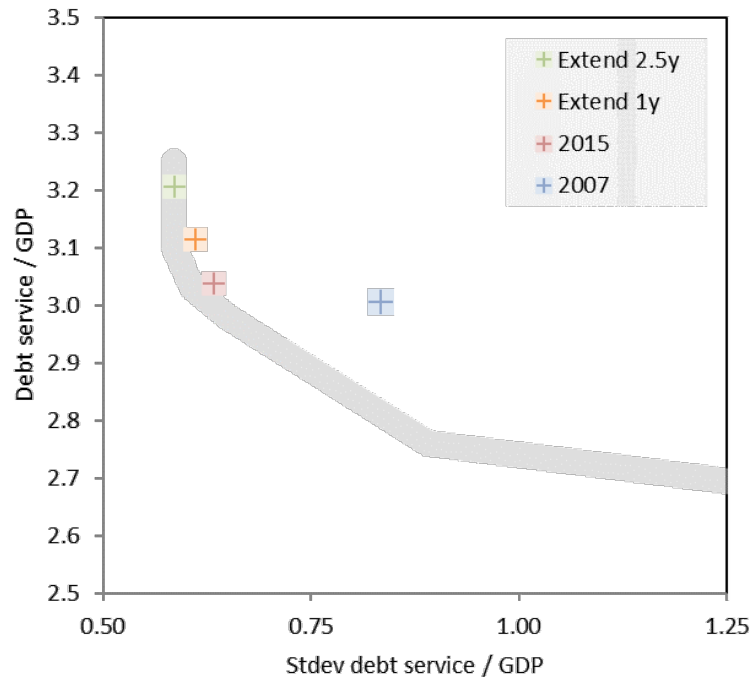
Optimal outcomes under different preferences for the debt manager



ASSESSMENT OF ACTUAL DEBT MANAGEMENT DECISIONS

- Treasury increased the WAM through a set of changes from 2009 to 2015
- That change appears to have been relatively efficient when variation is measured by debt service

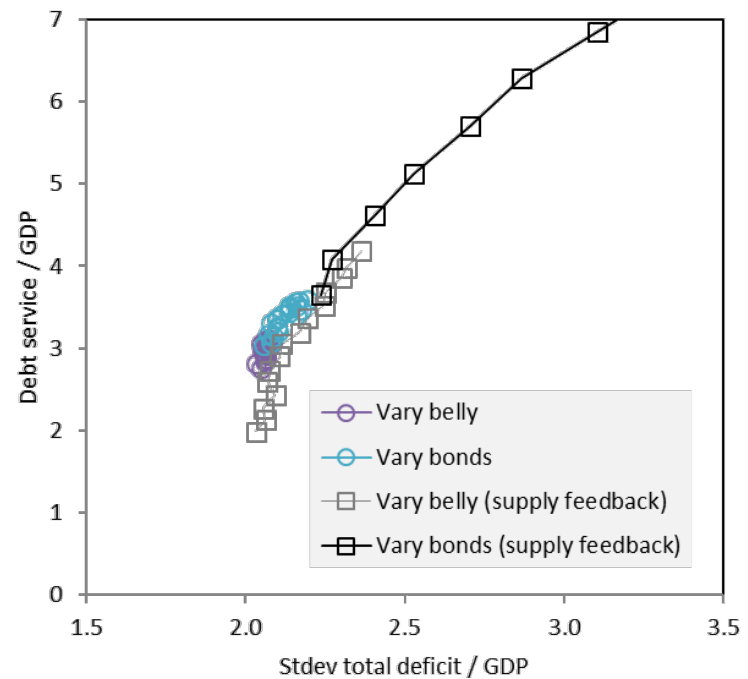
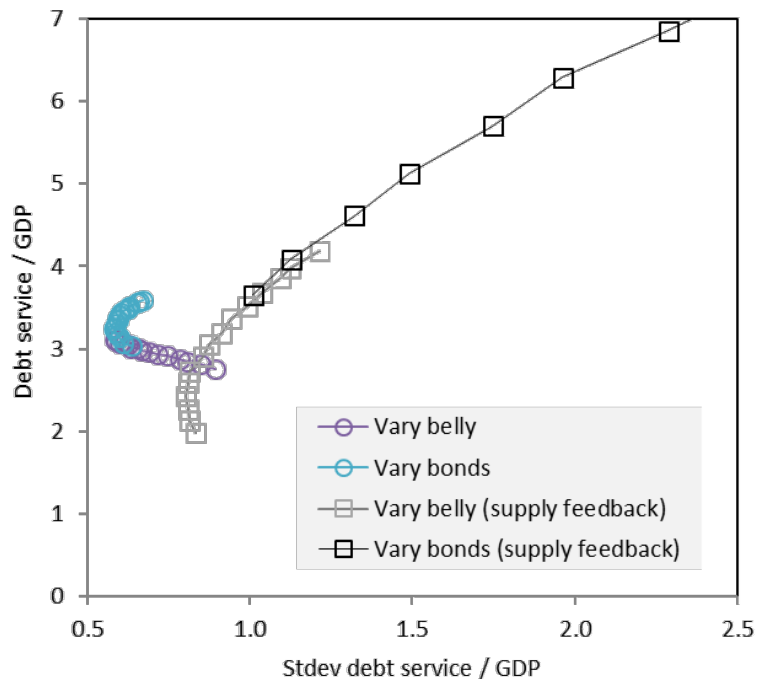
Historical issuance relative to the frontier



ALTERNATIVE TP ASSUMPTION: SUPPLY EFFECTS

- Assume feedback from the supply of duration to term premia
- This assumption makes heavy long-end issuance more problematic

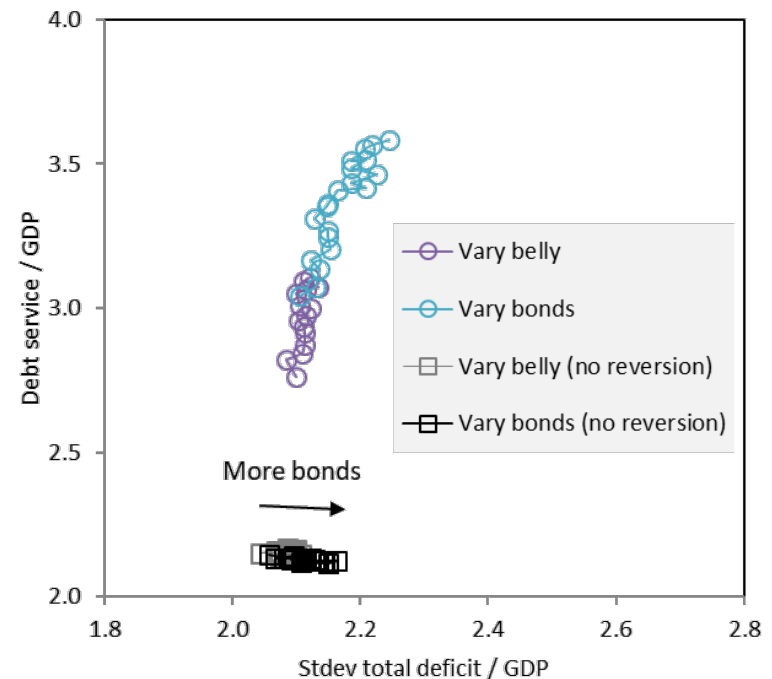
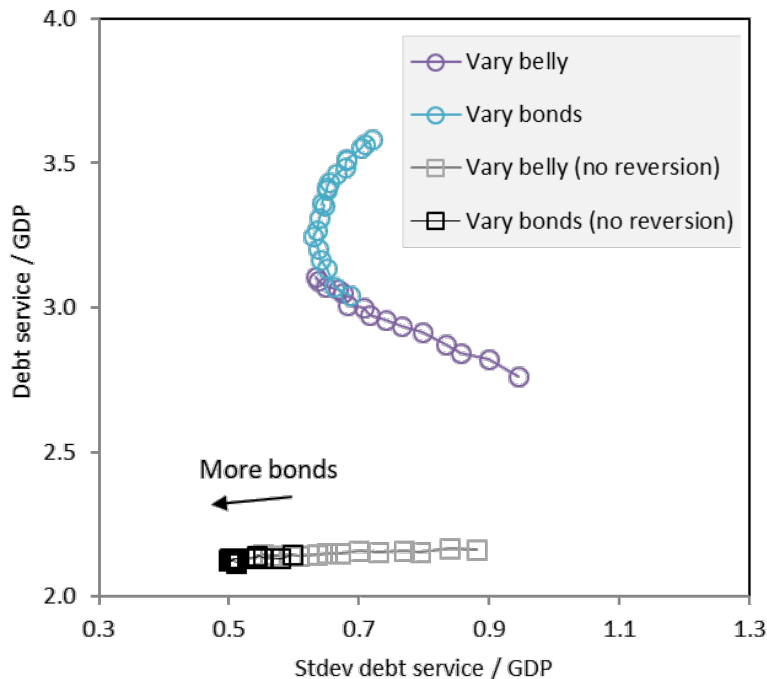
Alternative frontiers incorporating supply feedback on the term premium



ALTERNATIVE TP ASSUMPTION: NO MEAN REVERSION

- Assume term premia remain at current levels on average
- Results in much better outcomes for debt manager, bonds look attractive

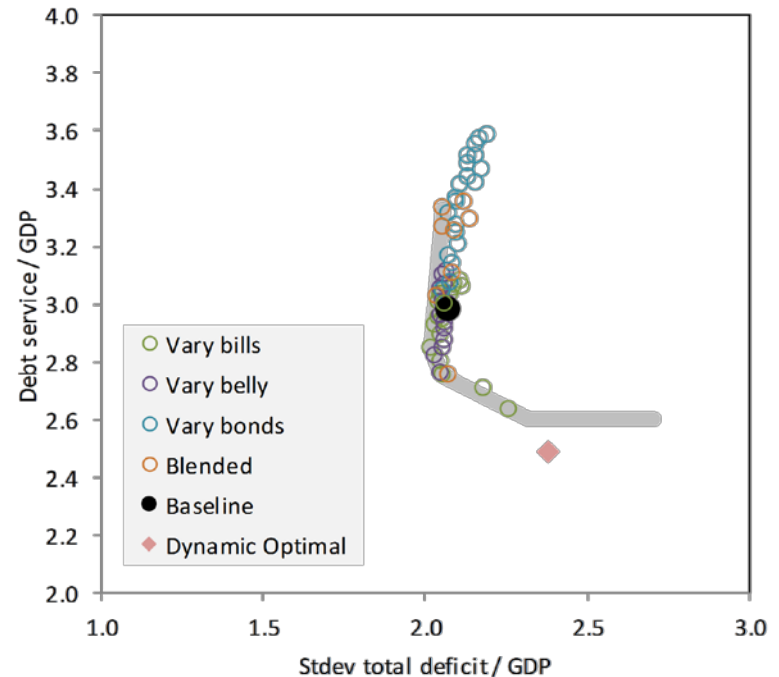
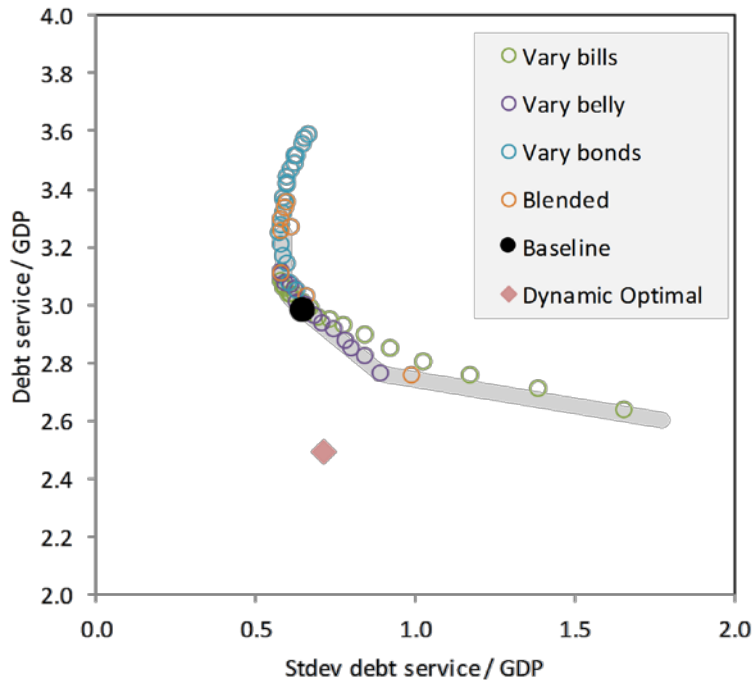
Alternative frontiers assuming no term premium reversion



DYNAMIC RESPONSE FUNCTION AND THE POLICY FRONTIER

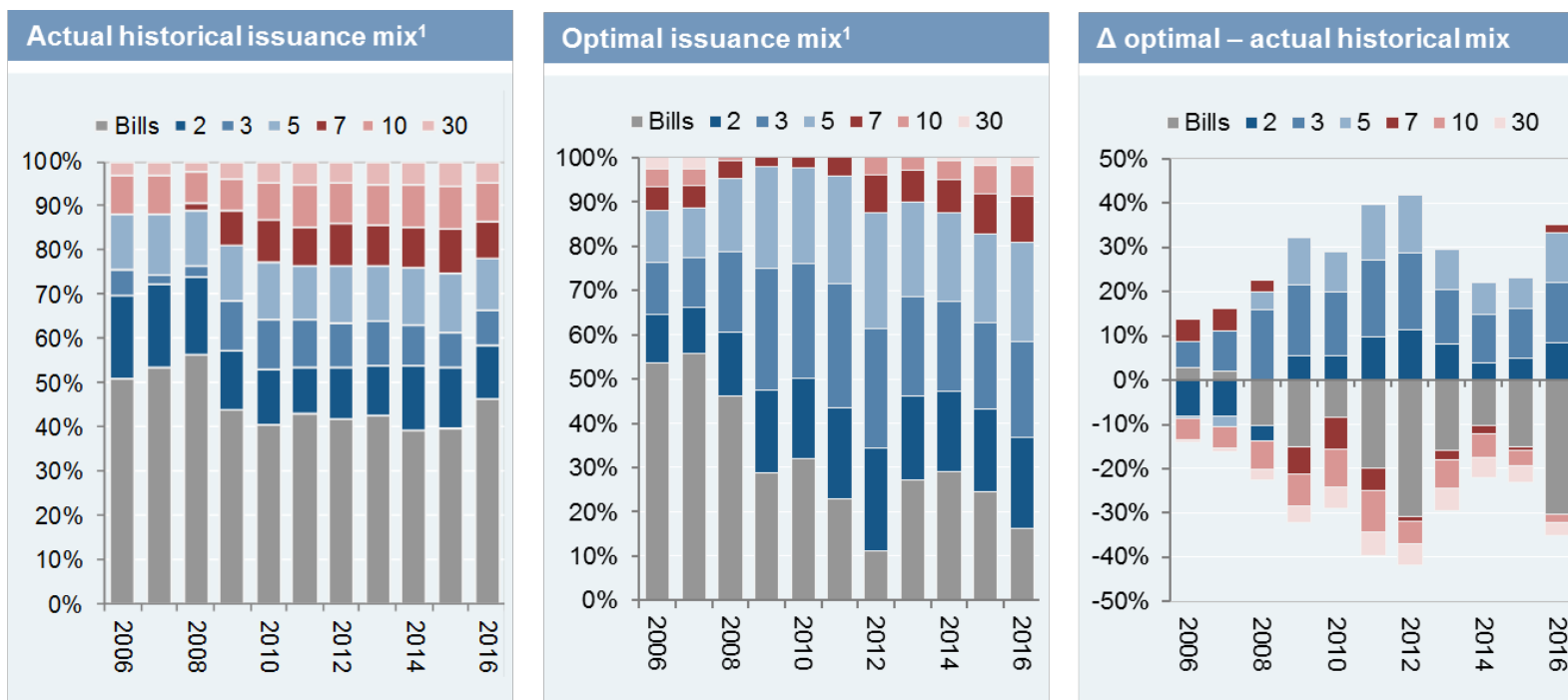
- Fully optimal strategy allows issuance to shift with economic conditions
- Performance is notably better than the static issuance frontier

Frontier under static issuance vs outcome of dynamic optimization



DYNAMIC RESPONSE FUNCTION AND HISTORICAL ISSUANCE

- Dynamic strategy would have had Treasury issue more securities with maturities of 2 to 5 years, as in the static issuance strategy
- It would have varied issuance patterns in response to market conditions

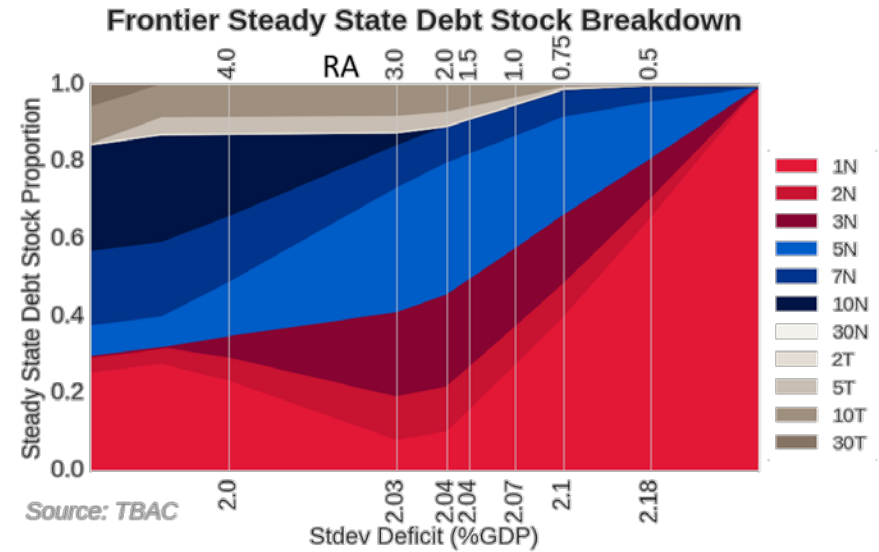
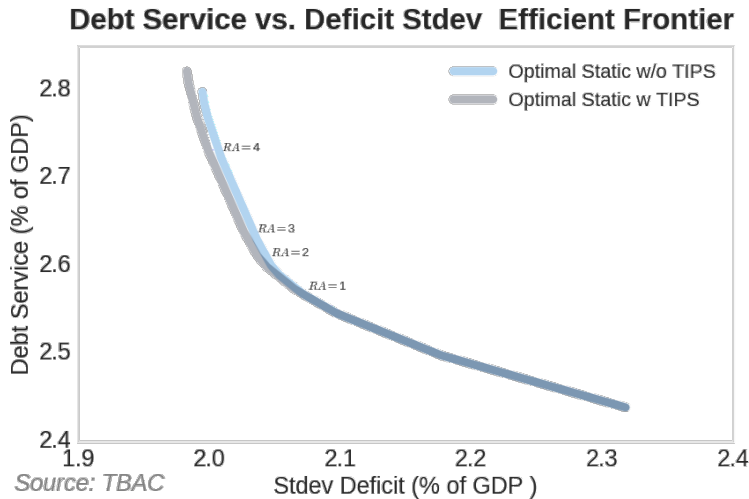


1. Bill issuance across varying tenors are all scaled to 1-year (52-week) tenor, i.e. 100B of 26-week Bills scales to 50B of 1-year equivalent Bills

TIPS AND THE POLICY FRONTIER

- Charge at most recent TBAC meeting extended the model to TIPS
- Results suggest some role for TIPS as risk aversion increases

Results from adding TIPS to the model



SUMMARY OF MODEL RESULTS

- Model is just one input into TBAC's discussion of debt management issues
- The model yields several important conclusions
 - Issuance of intermediate maturities appears attractive, as it provides significant reduction in the variation of funding costs with little additional expected cost
 - Short-end issuance is also attractive when variation is measured by the budget deficit, given the favorable correlation of short rates with the primary deficit
 - Issuance at the long-end is not attractive unless current levels of the term premium are expected to persist indefinitely
- The model indicates that significant gains can be achieved by varying issuance in a systematic manner
 - Response to term premium appears most important in that regard

