Presentation to the Treasury Borrowing Advisory Committee
Federal Budget Deficits FY2007 to FY2009

Fiscal Year to Date Deficits
(monthly data)

$ Billions

-1,600  -1,400  -1,200  -1,000  -800  -600  -400  -200  0  200  400  600  800  1,000  1,200  1,400  1,600

Oct-06 Nov-06 Dec-06 Jan-07 Feb-07 Mar-07 Apr-07 May-07 Jun-07 Jul-07 Aug-07 Sep-07 Oct-07 Nov-07 Dec-07 Jan-08 Feb-08 Mar-08 Apr-08 May-08 Jun-08 Jul-08 Aug-08 Sep-08 Oct-08 Nov-08 Dec-08 Jan-09 Feb-09 Mar-09 Apr-09 May-09 Jun-09 Jul-09 Aug-09 Sep-09

Office of Debt Management
Federal Outlays and Receipts

**Outlays**

- FY07
- FY08
- FY09

Outlays were up $558 B YoY

**Receipts**

- FY07
- FY08
- FY09

Receipts were down $413 B YoY

Source: DTS

DTS numbers are approximate and may not match MTS.
Tax Receipts Continue to Decline

Rolling 12-Month Growth Rates

- Corp Taxes
- WH Taxes
- nWH Taxes

WH taxes down $108 B YoY, or 11%

nWH taxes down $143 B YoY, or 31%

Corp taxes down $128 B YoY, or 36%

Office of Debt Management
# Treasury Marketable Financing in FY2008 and FY2009

## Treasury Marketable Financing

<table>
<thead>
<tr>
<th></th>
<th>FY 2009</th>
<th>FY 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Issued</td>
<td>Matured</td>
</tr>
<tr>
<td>Bills (includes SFPs)</td>
<td>$6,920.5</td>
<td>$6,417.8</td>
</tr>
<tr>
<td>Nominal coupons</td>
<td>$1,886.6</td>
<td>$640.7</td>
</tr>
<tr>
<td>TIPS</td>
<td>$58.5</td>
<td>$20.8</td>
</tr>
<tr>
<td>Total</td>
<td>$8,865.6</td>
<td>$7,079.3</td>
</tr>
</tbody>
</table>

*Note:* Negative SOMA activity represents redemptions. Positive SOMA activity represents additional issuance of securities, made possible by redemptions in maturing securities with the same settlement date; these are offsetting transactions and are net cash neutral.
Cumulative Net Financing Flows since FY2007
Cumulative Net Coupon Issuance since FY 2007
Treasury Daily Operating Cash Balance
Excluding SFPs

Note: Data through October 23, 2009

Daily Treasury Operating Cash Balances

Note: Data through October 23, 2009
Portfolio Distribution

Bills as a Share of Total Portfolio

Nominal Coupons as a Share of Total Portfolio

TIPS as a Share of Total Portfolio

Total Portfolio

Office of Debt Management
Monthly Change in Debt Outstanding versus Average Maturity

- **Issuance of SFP bills begins Sept 2008**
  - SFP bills peak at $560 B Nov 2008

- **GSE Preferred Stock Purchase Program begins Oct 2008**

- **Capital Purchase Program**
  - $115 B dispersed Oct 2008
  - $36 B disbursed Nov 2008

- **Bulk of $168 B Stimulus tax rebates disbursed**
  - May - Aug 2008

- **Average Maturity Oct 2008**: 48.5 months
  - Bills o/s: $1.9 T and Coupons o/s: $3.8 T

- **Average Maturity Sept 2009**: 52.7 months
  - Bills o/s: $1.9 T and Coupons o/s: $5.0 T

- **$40 B AIG Investment Nov 2008**

- **Tax year 2008 refunds peak Feb 2009**
Debt Maturity Measures

Average Maturity of Issuance

Average Maturity of Marketable Debt Outstanding

Rolling 4-quarter average
Maturing Coupons

In the next 5 years, 73 days will have maturities greater than $20 billion and 46 days greater than $30 billion.
# Primary Dealer and Government Deficit Estimates

## FY 2010 Deficit Estimates

<table>
<thead>
<tr>
<th></th>
<th>Primary Dealers*</th>
<th>CBO</th>
<th>OMB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current:</strong></td>
<td>1,393</td>
<td>1,381</td>
<td>1,502</td>
</tr>
<tr>
<td><strong>Range based on average absolute forecast error</strong></td>
<td>1,203-1,583</td>
<td>1,081-1,681</td>
<td>1,219-1,785</td>
</tr>
<tr>
<td><strong>Estimates as of:</strong></td>
<td>Oct 09</td>
<td>Aug 09</td>
<td>Aug 09</td>
</tr>
</tbody>
</table>

### FY 2010 Marketable Borrowing Range***
- 1,200-1,750

### FY 2011 Marketable Borrowing Range***
- 725-1,400

---

* Primary Dealers reflect average estimate. Based on Primary Dealer feedback on October 29, 2009.
*** Based on Primary Dealer feedback on October 29, 2009.
**OMB Long-term Deficit and Borrowing Projections**

**Debt as % of GDP**
- Held by Public (LHS)
- Held by Govt (LHS)

**Interest Expense as % of GDP**
- 10-y Rolling-Avg (RHS)

**Annual Surplus/Deficits**
- Surplus/Deficits (LHS)

**Net Marketable Borrowing as % of GDP**
- Held by Public (RHS)
- Held by Govt Accts% (RHS)

**Net Marketable Borrowing**
- Held by Public% (RHS)

**Surplus/Deficits as a % of GDP (RHS)**
Rescheduled 4-Week Bill Auctions Due to Calendar Constraints

In FY2009, the frequency with which 4-week auctions were rescheduled to 11:30 AM increased significantly.

7 auctions in FY2008
23 auctions in FY2009
4-Week Bill Coverage Ratios and Offering Amounts

![Chart showing coverage ratios and offering amounts.]

- Coverage ratio vs. Amount Offered (in Billions)
- Two data points: 1:00 p.m. Close and 11:30 a.m. Close
- Data points are scattered across the chart, indicating variability in coverage ratios and offering amounts.

Office of Debt Management
Potential Cost Saving of Moving to 30-Year TIPS

Graph shows 10-year and 20-year forward zero-coupon inflation levels for 10 years derived from Zero Coupon Inflation Swap data. Long-term inflation expectations are assumed to be stable; therefore, an upward sloping curve demonstrates an increasing inflation risk premium.

Source: Barclays Live
What adjustments to debt issuance, if any, should Treasury make in consideration of its financing needs in the short, medium, and long term?
TBAC Presentation to Treasury

November 3, 2009
TBAC Presentation to Treasury: Exit Strategies

November 3, 2009
Outline

• Importance of the Exit Strategy

• Form and likely Sequence
  • Removal of Excess Reserves
  • Ending the MBS purchase program
  • Raising the Funds rate target

• Implications for the Treasury and related markets

• Potential policy errors

• Conclusions/Recommendations
Importance of the Exit Strategy

• Near zero interest rates have had a significant impact on investor demand for many asset classes

• Many investors can not stay in cash or earn zero for long
  • Pension funds
  • Insurance companies
  • Endowments
  • Retired individuals living on income

• Zero yields on money market funds have pushed investors into longer-dated riskier asset classes

• The return of low cost financing as repo markets have reopened (aided by TALF and other Fed programs) has pushed leveraged investors into longer-dated riskier assets classes

• The increased demand has benefited Treasuries somewhat, but has benefited risk assets such as corporate bonds and securitized assets even more

• When the markets anticipate the move away from zero, the impact on longer dated risk assets may be significant due to reduced investor demand
Importance of the Exit Strategy

• Investors have been moving out of cash and into longer-dated risk assets as the markets have stabilized and cash earns zero

• This can be seen in mutual funds flows
Importance of the Exit Strategy

The sponsorship for longer dated risk assets has led to lower yields
Form and Likely Sequence of the Fed’s Exit Strategy

- The Fed has a very difficult task to get the form and timing correct
  - Importance of the first move
  - Uncertainty and fragility of the economic recovery
  - Dependence of housing and other sectors on low rates

- As a result, predicting the form and timing of the exit strategy is also difficult

- The most likely sequence appears to be
  1. Draining excess reserves
  2. Ending MBS purchases
  3. Raising the Funds rate target
Form and Likely Sequence: This Tightening Cycle is Different
Form and Likely Sequence: Excess reserves to neutralize

<table>
<thead>
<tr>
<th>Source</th>
<th>Excess Reserves</th>
</tr>
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<tbody>
<tr>
<td>End of 2009</td>
<td>~ $1500 billion</td>
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<tr>
<td>Liquidity facilities roll off</td>
<td>($300)</td>
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<tr>
<td>Securities roll off</td>
<td>($100) - ($200)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
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</tr>
</thead>
<tbody>
<tr>
<td>End of 2010</td>
<td>$1000 - $1100 billion</td>
</tr>
<tr>
<td>Securities roll off</td>
<td>($100) - ($200)</td>
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</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Excess Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of 2011</td>
<td>$800 - $1000 billion</td>
</tr>
</tbody>
</table>
Form and Likely Sequence: Alternatives for Neutralizing Reserves

• Raise the funds rate and thereby the rate paid on excess reserves
  • Increases opportunity cost of using reserves
  • *Potential complication(s): requires Fed to raise the funds rate*

• Reverse repurchase agreements
  • Banks and perhaps money markets potential counterparties
  • Changes composition of Fed’s liabilities
  • *Potential complication(s): reverse repos for TSYs cleaner than for MBS, scope for draining reserves unclear*

• Term deposits
  • Banks move overnight reserves into term facility
  • *Potential complication(s): Mechanism for setting rate and bank utilization unclear, implications for LIBOR market*

• Sell assets
  • Shrinks asset and liability sides of the balance sheet
  • *Potential complication(s): Private appetite for additional MBS and Treasury securities unclear*
Form and Likely Sequence: Reverse Repos

- Direct with Dealers
  - Initial capacity $150 - $200 billion
  - Tier one capital relief could boost capacity in some instances
  - Unlimited term

- Direct with Money Market funds
  - Initial capacity near $1000 billion
  - Term less than 7 days
  - Requires cumbersome setup

- TALF Model
  - Banks are agents; allow access to MM with cumbersome setup
  - No incentive for Banks

Market implications
- Compete with other short-term investments
- Upward pressure on bill rates
Form and Likely Sequence: balance sheets, reserves and treasury demand

Cumulative change in composition of bank assets

- Loans and leases declined from $7.3 trillion to $6.7 trillion over the past year
- Declines are being partially offset by securities purchases, particularly Treasuries
- Reserves being moved to securities?

Change in securities from Dec 17th

<table>
<thead>
<tr>
<th>Securities</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Treasuries and agencies</td>
<td>163.2</td>
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<tr>
<td>Other</td>
<td>65.7</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>228.9</strong></td>
</tr>
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</table>
The Fed’s purchases of MBS have had a significant impact on valuations.
Form and Likely Sequence: Ending MBS Purchases

Housing market still fragile and needs low mortgages rates

House Prices

60 days+ Mortgage Delinquencies

Gross MBS Issuance
Form and Likely Sequence: Raising the Fed Funds Rate

- Markets pricing in the first move in the first half of 2010 and expecting gradual tightening similar to the past.

- Another possibility is a discreet initial move (to 1% for example) to remove emergency level followed by a pause and then gradual tightening.
# Market Implications: Net Fixed Income Purchases

<table>
<thead>
<tr>
<th>2008</th>
<th>Open market paper</th>
<th>Treasuries</th>
<th>Agency/Agency MBS</th>
<th>Municipals</th>
<th>Corporates</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>-139</td>
<td>148</td>
<td>85</td>
<td>42</td>
<td>-143</td>
<td>-8</td>
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<tr>
<td>Financial</td>
<td>126</td>
<td>698</td>
<td>846</td>
<td>50</td>
<td>-41</td>
<td>1678</td>
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<tr>
<td>Nonfinancial</td>
<td>-59</td>
<td>-7</td>
<td>-4</td>
<td>-24</td>
<td>--</td>
<td>-95</td>
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<tr>
<td>State and Local Gov</td>
<td>-71</td>
<td>-9</td>
<td>-10</td>
<td>0</td>
<td>-4</td>
<td>-94</td>
</tr>
<tr>
<td>Federal Gov</td>
<td>--</td>
<td>--</td>
<td>54</td>
<td>--</td>
<td>--</td>
<td>54</td>
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<tr>
<td>Federal Reserve</td>
<td>--</td>
<td>-265</td>
<td>20</td>
<td>--</td>
<td>--</td>
<td>-245</td>
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<tr>
<td>Rest of the World</td>
<td>-45</td>
<td>674</td>
<td>-218</td>
<td>-4</td>
<td>40</td>
<td>447</td>
</tr>
<tr>
<td>Total</td>
<td>-189</td>
<td>1239</td>
<td>772</td>
<td>64</td>
<td>-149</td>
<td>1737</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2009</th>
<th>Open market paper</th>
<th>Treasuries</th>
<th>Agency/Agency MBS</th>
<th>Municipals</th>
<th>Corporates</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>-3</td>
<td>709</td>
<td>-1158</td>
<td>86</td>
<td>77</td>
<td>-290</td>
</tr>
<tr>
<td>Financial</td>
<td>-634</td>
<td>30</td>
<td>24</td>
<td>63</td>
<td>256</td>
<td>-261</td>
</tr>
<tr>
<td>Nonfinancial</td>
<td>26</td>
<td>21</td>
<td>2</td>
<td>17</td>
<td>--</td>
<td>67</td>
</tr>
<tr>
<td>State and Local Gov</td>
<td>-21</td>
<td>-4</td>
<td>-44</td>
<td>0</td>
<td>5</td>
<td>-64</td>
</tr>
<tr>
<td>Federal Gov</td>
<td>--</td>
<td>--</td>
<td>192</td>
<td>--</td>
<td>1</td>
<td>193</td>
</tr>
<tr>
<td>Federal Reserve</td>
<td>--</td>
<td>368</td>
<td>1079</td>
<td>--</td>
<td>--</td>
<td>1447</td>
</tr>
<tr>
<td>Rest of the World</td>
<td>-67</td>
<td>546</td>
<td>-135</td>
<td>9</td>
<td>-78</td>
<td>274</td>
</tr>
<tr>
<td>Total</td>
<td>-699</td>
<td>1670</td>
<td>-41</td>
<td>176</td>
<td>260</td>
<td>1366</td>
</tr>
</tbody>
</table>

$ billions
Market Implications: Concern about higher real rates rather than inflation?

5yr5yr Forward TIPS Inflation Expectations

Volatility Skew
(1y10yr 100 high vs. 100 low strike)
Market Implications: Issuance and debt outstanding

Quarterly Issuance

Marketable Debt Outstanding

Bills
Bonds
TIPS
2yr - 10yr
Market Implications: Average Maturity of the Debt

- **Average maturity of debt**
- **Projected**
- **Core CPI, y/y (right)**
- **10yr Treasury (right)**

The graph illustrates the trends in average maturity of the debt over time, alongside Core CPI and 10-year Treasury yields. The maturity data spans from 1980 to 2016, showing significant fluctuations.
Market Implications: More TIPS Issuance

Advantages
- Diversify and broaden the buyer base of Treasury debt in time of extreme borrowing need
- Potentially further lower the funding cost of nominals if TIPS remove some inflation risk
  premium
- Further extends average maturity of issuance and debt
- Limited risk because tax receipts effectively hedge Treasury inflation exposure

Disadvantages
- Given low breakevens, there is potential for higher explicit cost relative to nominal
- If there is substantial further disinflation or deflation, buyer base for TIPS may dwindle just
  as issuance increases

TIPS as Percentage of Nominals Outstanding

![Graph showing TIPS as percentage of nominals outstanding over time.](image-url)
Potential Policy Errors

Fiscal considerations
• Lack of budgetary restraint
  • Big issue for non-US investors
  • Need spending cuts or tax revenue increases as economy stabilizes
  • Need to refrain from a second fiscal stimulus

Monetary considerations
• Liquidity programs
  • Many of the programs addressing the money markets and financing can be removed now
  • TALF is still needed to restart the shadow banking system, particularly for more difficult assets
• MBS program
  • Housing market still needs low rate
  • Stopping purchases vs. selling MBS
• Traditional policy
  • Raising rates too soon is the bigger risk
Conclusions

• The Fed’s exit strategy is a significant challenge and the form and timing will have a significant impact on the broad financial markets

• The likely first step will be the use of reverse repos to remove excess reserves from the banking system

• The eventual increase in the Fed funds rate target will have the biggest impact and will likely come at a time when supply of fixed income securities is increasing and the Fed has stopped purchasing longer-dated securities

• The Treasury should continue to have a very transparent plan to increase issuance given the growing deficit and
  • Extend average maturity
  • Issue more inflation-linked debt
Treasury Borrowing Advisory Committee:
Optimal Issuance Strategy

Quarterly Meeting
November 3, 2009
Questions

Given the recent trends in the economy and the government’s fiscal position, please discuss Treasury’s plan to lengthen the average maturity of the portfolio in the medium term. Is there an optimal average maturity range, given structural financing needs in the medium and long term? Does it make sense to apply asset-liability management to Treasury’s marketable debt portfolio? Can you discuss approaches to financing and risk management by other sovereign nations and how they might be applicable to the US Treasury debt management?
Agenda

- Background
- Optimization Model/Debt management strategies
- Conclusions:

1. Inflation, higher interest rate and roll over risk should be the primary concerns in Treasury’s debt management strategies.

2. In most scenarios, it is prudent to lengthen maturities significantly from current average maturity of 50 months. Our base case is to extend to 74 months, stretch case to extend to 96 months.

3. The objective of lowest borrowing cost could lead to higher yields that conflict with monetary policy objective.

4. Clever debt management strategy could potentially reduce debt service cost meaningfully, but still can’t completely substitute for prudent fiscal policy.
Comparison of debt management strategies across the G7

<table>
<thead>
<tr>
<th>Country</th>
<th>Avg Maturity (years)</th>
<th>% Foreign Ownership</th>
<th>Total Public Debt (USD $bn)</th>
<th>Ratio of Debt to revenue</th>
<th>Ratio of Debt to GDP</th>
<th>Ratio of debt as share of revenue</th>
<th>Methodology</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>4.25</td>
<td>49%</td>
<td>7561**</td>
<td>359%</td>
<td>53%</td>
<td>18%</td>
<td></td>
<td>Cashflow matching. No ALM framework currently used</td>
</tr>
<tr>
<td>UK</td>
<td>14.2</td>
<td>30%</td>
<td>1,347.1</td>
<td>118%</td>
<td>58%</td>
<td>3.30%</td>
<td></td>
<td>Cashflow matching. No ALM framework currently used</td>
</tr>
<tr>
<td>Germany</td>
<td>6.10</td>
<td>30%*</td>
<td>1522</td>
<td>151%</td>
<td>65.90%</td>
<td>6.10%</td>
<td></td>
<td>Optimizes mix of funding instruments to minimize long term cost and risk for the issuer. Derivative instruments such as swaps are also used</td>
</tr>
<tr>
<td>France</td>
<td>6.70</td>
<td>30%*</td>
<td>1699.7</td>
<td>137%</td>
<td>67.40%</td>
<td>5.70%</td>
<td></td>
<td>Cashflow management. Management of average maturity and effort made to ensure liquidity in issues</td>
</tr>
<tr>
<td>Italy</td>
<td>6.87</td>
<td>30%*</td>
<td>2382.5</td>
<td>230%</td>
<td>105.80%</td>
<td>11.10%</td>
<td></td>
<td>Strategic scenario analysis and risks. Use of various cash and derivatives products to minimize cost of debt and reduce risk</td>
</tr>
<tr>
<td>Japan</td>
<td>7.00</td>
<td>6%</td>
<td>9875.1</td>
<td>2331%</td>
<td>190%</td>
<td>26.20%</td>
<td></td>
<td>Cashflow matching. No ALM framework currently used</td>
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<tr>
<td>Australia</td>
<td>5.60</td>
<td>53%</td>
<td>92.87</td>
<td>19%</td>
<td>4.60%</td>
<td>2.60%</td>
<td></td>
<td>Cost and risk optimization. Use of swaps until Nov 2007</td>
</tr>
<tr>
<td>New Zealand</td>
<td>5.60</td>
<td>72%</td>
<td>35.8</td>
<td>49%</td>
<td>15.60%</td>
<td>6.00%</td>
<td></td>
<td>Driven by set of principles to minimize risk and costs of debt and help the DMO issue debt cost-effectively. Focus is on fiscal control, government balance sheet risk management, and containment of moral hazard, and limiting contingent liability risk to the Government. Contingent liabilities are disclosed, analyzed and contained on a sub-national level with limited central government intervention.</td>
</tr>
</tbody>
</table>

* Estimated ownership for Eurozone debt by non Eurozone members

** Debt held by public

Source: JP Morgan
Average maturity of outstanding treasuries is approximately 50 months, which is near 25-year lows!

Source: JP Morgan
Total federal government debt to GDP ratio was only higher during WW II

Source: Bianco Research
Debt to GDP about to go up significantly

Source: White House Office of Management and Budget, Congressional Budget Office
Mandatory spending has increased 5x faster than discretionary spending

Source: The Heritage Foundation 2009 Federal Revenue and Spending Book of Charts; and White House office of Management and Budget
Entitlement spending is confronting a demographic time bomb

Source: The Heritage Foundation 2009 Federal Revenue and Spending Book of Charts; and Congressional Budget Office
Plausible budget deficit outlook

<table>
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<tbody>
<tr>
<td>CBO August Baseline</td>
<td>-1587</td>
<td>-1381</td>
<td>-921</td>
<td>-590</td>
<td>-538</td>
<td>-558</td>
<td>-558</td>
<td>-620</td>
<td>-625</td>
<td>-622</td>
<td>-722</td>
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Plausible Revenue Changes

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<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>EGTRRA &amp; JGTRAA</td>
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<td>-4</td>
<td>-121</td>
<td>-217</td>
<td>-247</td>
<td>-260</td>
<td>-271</td>
<td>-281</td>
<td>-290</td>
<td>-298</td>
<td>-307</td>
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<tr>
<td>AMT</td>
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<td>-7</td>
<td>-69</td>
<td>-31</td>
<td>-34</td>
<td>-37</td>
<td>-41</td>
<td>-46</td>
<td>-53</td>
<td>-60</td>
<td>-70</td>
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<td>-53</td>
<td>-58</td>
<td>-64</td>
<td>-70</td>
<td>-77</td>
<td>-85</td>
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<tr>
<td>Making Work Pay, etc.</td>
<td>0</td>
<td>-48</td>
<td>-141</td>
<td>-199</td>
<td>-203</td>
<td>-201</td>
<td>-199</td>
<td>-198</td>
<td>-199</td>
<td>-202</td>
<td>-205</td>
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<tr>
<td>High Income</td>
<td>0</td>
<td>76</td>
<td>106</td>
<td>131</td>
<td>140</td>
<td>147</td>
<td>155</td>
<td>165</td>
<td>175</td>
<td>186</td>
<td>186</td>
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<tr>
<td>Debt Service</td>
<td>0</td>
<td>0</td>
<td>-4</td>
<td>-17</td>
<td>-42</td>
<td>-75</td>
<td>-109</td>
<td>-146</td>
<td>-189</td>
<td>-236</td>
<td>-286</td>
</tr>
<tr>
<td><strong>Subtotal Rev</strong></td>
<td>0</td>
<td>17</td>
<td>-242</td>
<td>-377</td>
<td>-435</td>
<td>-479</td>
<td>-523</td>
<td>-570</td>
<td>-626</td>
<td>-687</td>
<td>-767</td>
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</table>

Plausible Spending Changes

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<tbody>
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<td>Inflatable Discretionary by GDP</td>
<td>0</td>
<td>-8</td>
<td>-33</td>
<td>-74</td>
<td>-120</td>
<td>-159</td>
<td>-194</td>
<td>-228</td>
<td>-261</td>
<td>-294</td>
<td>-328</td>
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<tr>
<td>Iraq War Phaseout</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>29</td>
<td>59</td>
<td>83</td>
<td>97</td>
<td>104</td>
<td>106</td>
<td>111</td>
<td>115</td>
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<tr>
<td>Debt Service</td>
<td>0</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>-3</td>
<td>-8</td>
<td>-13</td>
<td>-19</td>
<td>-28</td>
<td>-39</td>
<td>-52</td>
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<tr>
<td><strong>Subtotal Disc. Spending</strong></td>
<td>0</td>
<td>-7</td>
<td>-27</td>
<td>-46</td>
<td>-64</td>
<td>-84</td>
<td>-110</td>
<td>-143</td>
<td>-183</td>
<td>-222</td>
<td>-265</td>
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<tr>
<td><strong>Total Change</strong></td>
<td>0</td>
<td>10</td>
<td>-269</td>
<td>-423</td>
<td>-499</td>
<td>-563</td>
<td>-633</td>
<td>-713</td>
<td>-809</td>
<td>-909</td>
<td>-1032</td>
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</table>

Resulting Surplus / Deficit

<table>
<thead>
<tr>
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<th></th>
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<th></th>
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<th></th>
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<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>14140</td>
<td>14439</td>
<td>14993</td>
<td>15754</td>
<td>16598</td>
<td>17319</td>
<td>18019</td>
<td>18760</td>
<td>19524</td>
<td>20308</td>
<td>21114</td>
</tr>
<tr>
<td>Deficits as % of GDP</td>
<td>-11.2%</td>
<td>-9.5%</td>
<td>-7.9%</td>
<td>-6.4%</td>
<td>-6.2%</td>
<td>-6.5%</td>
<td>-6.6%</td>
<td>-7.1%</td>
<td>-7.3%</td>
<td>-7.5%</td>
<td>-8.3%</td>
</tr>
<tr>
<td>Debt Held by Public</td>
<td>7612</td>
<td>8984</td>
<td>10174</td>
<td>11186</td>
<td>12224</td>
<td>13345</td>
<td>14536</td>
<td>15869</td>
<td>17304</td>
<td>18836</td>
<td>20590</td>
</tr>
<tr>
<td>Debt / GDP</td>
<td>54%</td>
<td>62%</td>
<td>68%</td>
<td>71%</td>
<td>74%</td>
<td>77%</td>
<td>81%</td>
<td>85%</td>
<td>89%</td>
<td>93%</td>
<td>98%</td>
</tr>
<tr>
<td>Interest</td>
<td>177</td>
<td>199</td>
<td>250</td>
<td>319</td>
<td>420</td>
<td>556</td>
<td>657</td>
<td>746</td>
<td>841</td>
<td>934</td>
<td>1038</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>2.3%</td>
<td>2.2%</td>
<td>2.5%</td>
<td>2.9%</td>
<td>3.4%</td>
<td>4.2%</td>
<td>4.5%</td>
<td>4.7%</td>
<td>4.9%</td>
<td>5.0%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>

Source: Concord Coalition, CBO, JCT, The Lindsey Group
The federal budget has benefited from the decline in rates, BUT approximately 40% of marketable Treasury securities now mature in less than 1 year.

**Interest payments on federal debt**

![Chart showing interest payments on federal debt from 1979 to 2009.](chart)

- **Net interest as % of federal budget**
- **Average interest paid**

*Source: Economic Report of the President 2009*
Interest payments to rise substantially

Large fiscal expansions coupled with debt monetization lead to inflation

Source: Deutsche Bank Global Markets Research
Optimal Maturity of Issuance
Definition of the problem

Overview

- Across a range of 15 economic and credit scenarios, we project funding needs over the next 10 years
- Our goal is to find the optimal average maturity of debt issuance given different risk scenarios over the next 3 years

Setup of problem:

- **Decision variable**: % gross issuance of 2009-2011 to be issued in 3-months and 10-years
- **Objective**: Minimize the total cost of debt service from 2010-2020 (try to consider a confidence crisis on sovereign credit by 2020)
- **Constraints**:
  - Maintain enough net issuance in bills and 10-years to meet investor needs
- **Additional Consideration**
  - Keep yields within a range to achieve monetary policy goals
Overview of the model
Macro and credit scenarios

- The model considers 15 scenarios:
  - 5 macro scenarios: combinations of growth and inflation
  - 3 credit scenarios: optimistic, base case and disaster

### Four focus scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Inflation</th>
<th>Real Growth</th>
<th>Fannie/Freddie</th>
<th>FDIC</th>
<th>Extraordinary Assistance</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Base Case</td>
<td>2%</td>
<td>2%</td>
<td>$300</td>
<td>$200</td>
<td>$75</td>
<td>$575</td>
</tr>
<tr>
<td>2</td>
<td>Low Growth, low inflation (Japan)</td>
<td>0%</td>
<td>0%</td>
<td>$300</td>
<td>$200</td>
<td>$75</td>
<td>$575</td>
</tr>
<tr>
<td>3</td>
<td>Moderate growth, high inflation</td>
<td>2%</td>
<td>5%</td>
<td>$300</td>
<td>$200</td>
<td>$75</td>
<td>$575</td>
</tr>
<tr>
<td>4</td>
<td>High credit loss</td>
<td>2%</td>
<td>2%</td>
<td>$600</td>
<td>$600</td>
<td>$200</td>
<td>$1,400</td>
</tr>
</tbody>
</table>
Yield curve dynamics

- The 10-year rate is the sum of:
  - Real growth rate
  - Inflation
  - Credit spread: based on amount of credit losses
  - Inflation risk premium: 50 bps + 20% of current inflation
  - An adjustment for duration supply: assume $1trn in net issuance leads to 1% increase in yields. *

- The 3-month point is largely determined by the Fed:
  - Taylor rule: \( \frac{d(3\text{-month Yield})}{d(\text{Inflation})} = 1.5 * \frac{d(\text{Inflation})}{d(\text{Real Growth})} + 0.5 \)
  - The 3-month credit spread is smaller than the 10-year spread and varies by credit scenario
  - The impact of duration supply is small: $1trn in net issuance increases yields by 7 bps

### Rates in 2020 across focus scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Growth</th>
<th>Inflation</th>
<th>Credit Spread</th>
<th>Inflation Risk Prem</th>
<th>Impact of Durn Supply</th>
<th>10-yr Yield</th>
<th>3m Yield</th>
<th>Debt/GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>2.0%</td>
<td>2.0%</td>
<td>0.25%</td>
<td>0.9%</td>
<td>2.3%</td>
<td>7.5%</td>
<td>2.9%</td>
<td>123%</td>
</tr>
<tr>
<td>Japan</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.25%</td>
<td>0.5%</td>
<td>2.1%</td>
<td>2.8%</td>
<td>0.0%</td>
<td>149%</td>
</tr>
<tr>
<td>High Inflation</td>
<td>2.0%</td>
<td>5.0%</td>
<td>0.25%</td>
<td>1.5%</td>
<td>2.9%</td>
<td>11.7%</td>
<td>7.4%</td>
<td>117%</td>
</tr>
<tr>
<td>High Credit</td>
<td>2.0%</td>
<td>2.0%</td>
<td>1.75%</td>
<td>0.9%</td>
<td>2.9%</td>
<td>9.6%</td>
<td>4.3%</td>
<td>140%</td>
</tr>
</tbody>
</table>

* A recent study by JP Morgan concluded that net issuance of 10yrs in the amount of 1% of GDP causes yield to rise by 30bps. This would imply that yields would rise by 2% given $1 trn in issuance. We found this lead to yield curves that were implausibly steep by 2020 so we halved the effect. We do feel that the effect we used in our model is on the conservative side.
## Federal budget in focus scenarios

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>56%</td>
<td>55</td>
<td>74</td>
<td>2.2%</td>
<td>5.8%</td>
<td>2.9%</td>
<td>7.5%</td>
<td>9%</td>
</tr>
<tr>
<td>Japan</td>
<td>81%</td>
<td>26</td>
<td>51</td>
<td>0.2%</td>
<td>2.8%</td>
<td>0.0%</td>
<td>2.8%</td>
<td>7%</td>
</tr>
<tr>
<td>High Inflation</td>
<td>3%</td>
<td>116</td>
<td>96</td>
<td>4.4%</td>
<td>7.8%</td>
<td>7.4%</td>
<td>11.7%</td>
<td>11%</td>
</tr>
<tr>
<td>High Credit</td>
<td>42%</td>
<td>70</td>
<td>83</td>
<td>2.6%</td>
<td>7.0%</td>
<td>4.3%</td>
<td>9.6%</td>
<td>9%</td>
</tr>
</tbody>
</table>
Optimization across scenarios

- In the low growth / low inflation scenario, we want to keep issuance as short as possible
- In the high inflation scenario, we should issue long now to lock in low rates

**Average Debt Service / GDP: 2015-2020**

*Line shows optimal maturity of issuance to minimize total debt service cost for 2009-2020*
*Number in parentheses is average maturity of total debt at the end of 2011*
Optimal issuance across macro and credit scenarios

Current macro environment

<table>
<thead>
<tr>
<th>Real Growth</th>
<th>Inflation</th>
<th>Recent Issuance</th>
<th>Yield Curve</th>
<th>Deficit / GDP</th>
<th>Debt / GDP</th>
<th>Debt Service / GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1%</td>
<td>1%</td>
<td>% of Bills</td>
<td>Maturity</td>
<td>3m</td>
<td>10y</td>
<td>14%</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>70%</td>
<td>26</td>
<td>0.08%</td>
<td>3.59%</td>
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</table>

Optimal issuance for a given macro environment

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<tbody>
<tr>
<td>0%</td>
<td>0%</td>
<td>% Bills in Gross Supply</td>
<td>Debt Maturity</td>
<td>3m</td>
<td>10y</td>
<td>80.6%</td>
</tr>
<tr>
<td>2%</td>
<td>2%</td>
<td>55.6%</td>
<td>55</td>
<td>2.2%</td>
<td>5.8%</td>
<td>8.9%</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>3.4%</td>
<td>116</td>
<td>4.4%</td>
<td>7.8%</td>
<td>11.1%</td>
</tr>
<tr>
<td>4%</td>
<td>0%</td>
<td>62.7%</td>
<td>47</td>
<td>1.2%</td>
<td>5.5%</td>
<td>7.0%</td>
</tr>
<tr>
<td>4%</td>
<td>5%</td>
<td>0.0%</td>
<td>120</td>
<td>4.9%</td>
<td>8.8%</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

Optimal issuance for a given macro/credit environment

<table>
<thead>
<tr>
<th>Real Growth</th>
<th>Inflation</th>
<th>Credit Losses (bn)</th>
<th>Base Case Tax Rate</th>
<th>30% Higher Taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
<td>$6</td>
<td>82.7%</td>
<td>23</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>$575</td>
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<td>26</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>$1,400</td>
<td>73.1%</td>
<td>34</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>$6</td>
<td>6.5%</td>
<td>112</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>$575</td>
<td>3.4%</td>
<td>116</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>$1,400</td>
<td>0.0%</td>
<td>120</td>
</tr>
</tbody>
</table>

Optimal issuance for a given macro/credit environment

<table>
<thead>
<tr>
<th>Real Growth</th>
<th>Inflation</th>
<th>Credit Losses (bn)</th>
<th>Base Case Tax Rate</th>
<th>30% Higher Taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
<td>$6</td>
<td>85.7%</td>
<td>20</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>$575</td>
<td>83.6%</td>
<td>22</td>
</tr>
<tr>
<td>0%</td>
<td>0%</td>
<td>$1,400</td>
<td>76.3%</td>
<td>31</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>$6</td>
<td>13.2%</td>
<td>105</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>$575</td>
<td>10.5%</td>
<td>108</td>
</tr>
<tr>
<td>2%</td>
<td>5%</td>
<td>$1,400</td>
<td>0.0%</td>
<td>120</td>
</tr>
</tbody>
</table>
Impact of duration supply

- Our choice of maturity is highly dependent on the impact of duration supply on yields
- All else equal if issuing more long debt has a larger impact on rates, the optimal maturity will be shorter

Average Debt Service Across all Scenarios / GDP: 2015-2020

- $1 trn in issuance -> 1% in yield
- $1 trn in issuance -> 2% in yield
Implications of monetary policy constraints for debt issuance

♦ The lowest-cost issuance strategy may lead to yields that conflict with monetary policy goals

♦ If we restrict ourselves to strategies that limit near-term bond yields, the maturity of issuance will be shorter

### Issuance strategies across targeted yields

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</thead>
<tbody>
<tr>
<td>None</td>
<td>79</td>
<td>87</td>
<td>5.7%</td>
</tr>
<tr>
<td>5.5%</td>
<td>74</td>
<td>84</td>
<td>5.7%</td>
</tr>
<tr>
<td>5.0%</td>
<td>56</td>
<td>75</td>
<td>5.8%</td>
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<tr>
<td>4.5%</td>
<td>41</td>
<td>65</td>
<td>5.9%</td>
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<td>4.0%</td>
<td>28</td>
<td>53</td>
<td>6.2%</td>
</tr>
<tr>
<td>3.5%</td>
<td>16</td>
<td>41</td>
<td>6.7%</td>
</tr>
<tr>
<td>3.0%</td>
<td>15</td>
<td>39</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

* Maximum across all scenarios
** Average across scenarios
The choice of maturity matters, but without budgetary restraint the cost of debt could spiral

♦ In a high credit loss, high inflation scenario issuing long-dated debt from 2009-2011 can reduce debt service cost in 2020 by 13% of government revenues

♦ But even with the optimal maturity debt service costs will be unbearable

♦ The dashed lines assume spending is cut by 30% by 2012
Recap

Four Conclusions:

1. Inflation, higher interest rate and roll over risk should be the primary concerns in Treasury’s debt management strategies.

2. In most scenarios, it is prudent to lengthen maturities significantly from current average maturity of 50 months. Our base case is to extend to 74 months, stretch case to extend to 96 months.

3. The objective of lowest borrowing cost could lead to higher yields that conflict with monetary policy objective.

4. Clever debt management strategy could potentially reduce debt service cost meaningfully, but still can’t completely substitute for prudent fiscal policy.
Future Research

- We did not fully consider entitlement and state and local government as potential contingent liabilities. Hence risk to the model is to the upside.
- We can enhance the model on duration supply going forward. Current literature focused on historical regression. Possible new variables to consider: oil, dollar debasement, change of foreign demand, and US saving rate.
- We can attempt to model the rollover risk in a different context. We can tie the front end credit spread to the amount of short term debt maturing within a certain time frame.