

Treasury Borrowing Advisory Committee Meeting

November 3, 2015

TBAC Charge

As prudent debt managers, Treasury regularly considers ways to manage its debt portfolio effectively

We would like the Committee's views on the practicality and potential considerations of applying an **Asset-Liability Management framework** to Treasury's debt issuance strategy

What approaches could Treasury consider to minimize cost and optimize the composition of net new issuance to finance various assets and liabilities, such as student loans or entitlement benefits?

Executive Summary

- Asset Liability Management (“ALM”) is an application of Enterprise Risk Management that utilizes simplifying assumptions to identify, manage and measure risks in the context of sound financial management principles
- Sovereign governments present unique ALM challenges given balance sheet components that are more difficult to model, including non-financial assets and contingent assets and liabilities
- A holistic use of ALM is unworkable for the U.S. because of the size and complexity of the balance sheet and the economy
- Decisions of whether and how to proceed with a broad application of ALM should be informed by the extent to which the U.S. is exposed to rollover risk
- The student loan portfolio lends itself to an ALM framework and provides some practical insight into the relevance of ALM to the Treasury

What is Enterprise Risk Management?

- Enterprise Risk Management (ERM) is a framework where risks are identified, monitored and managed **subject to an entity's risk appetite** to provide for the achievement of its objectives
- Risks include interest rate risk, credit risk, currency risk, operational risk, reputational risk and many others
- Identification of risks informs the decision to monitor or mitigate their potential impacts, which depends on the entity's risk appetite as well as market conditions
- ERM can preserve or enhance enterprise valuation by providing a **framework to assess risk and return trade-offs**, including the cost of any desired risk reduction

What is Asset Liability Management?

ALM is a practical application of ERM for entities that want to reduce unnecessary balance sheet sensitivity to any set of variables

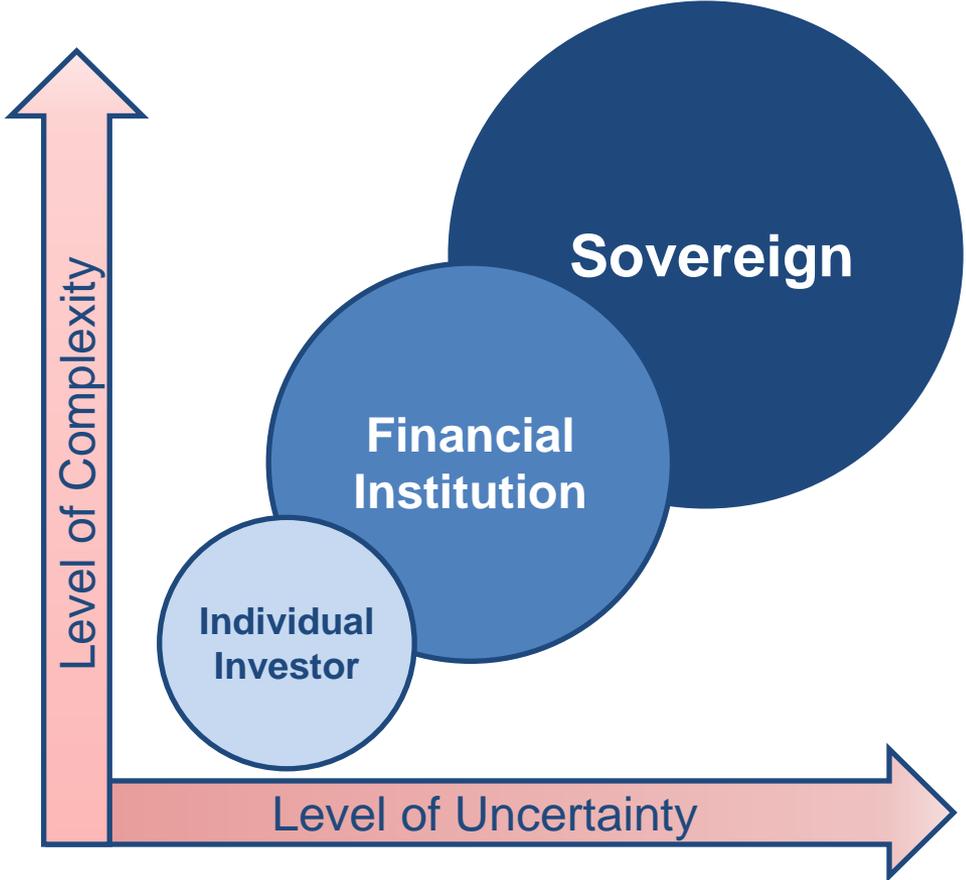
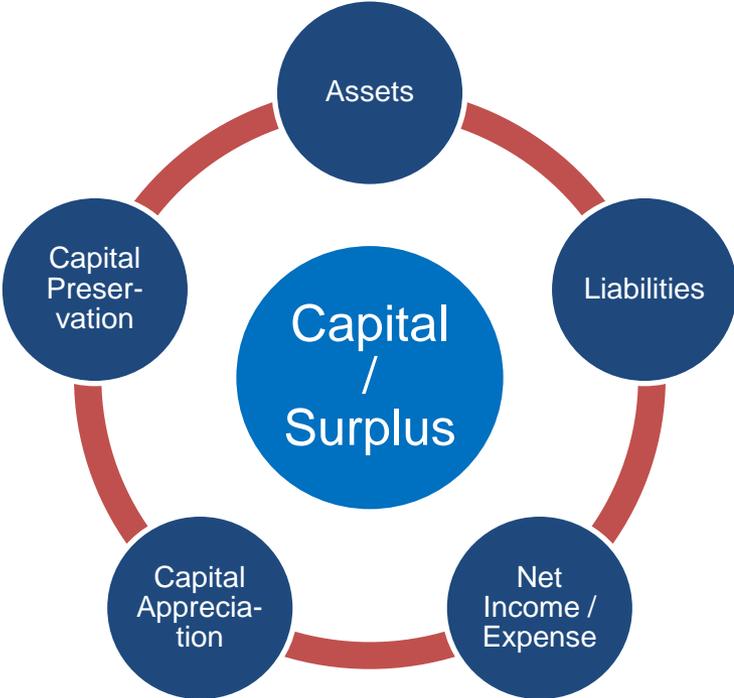
From Society of Actuaries:

- ALM is the practice of managing a business so that decisions and actions taken with respect to assets and liabilities are **coordinated**
- ALM can be defined as the **ongoing process** of formulating, implementing, monitoring and revising strategies related to assets and liabilities **to achieve an organization's financial objectives given its risk tolerances and other constraints**
- ALM is relevant to, and critical for, the sound management of the finances of **any organization that invests to meet its future cash flow needs and capital requirements**

How Is ALM Implemented?

Theoretical considerations are similar...

...but practical applications are very different



What Risks Can ALM Address?

Risk	Consideration for Corporation	Consideration for Sovereign
Interest Rate	Duration and cash flow mismatches can lead to the need to increase liability reserves, reducing the company's equity position	Minimizing long-run financial costs related to government debt
Liquidity & Rollover	Appropriate levels of liquid assets relative to short-term liabilities or products with demand deposit features ensures avoidance of a "run on the bank"	Maintaining a liquid local currency maturity curve allows for balancing rollover risk and funding costs
Capital Sufficiency	Reduces equity volatility at regulated entities, allowing for more timely and consistent return of profits to equity investors	Sovereign net worth is improved by managing debt issuance to minimize both cost and debt servicing volatility on behalf of taxpayers
Inter-temporal Consumption Trade-offs	Framework creates a roadmap to achieve financial objectives with the risk constraints	Managing intergenerational risk includes analyzing the impact of financing current consumption with long-term debt, which may be positive for current taxpayers but could negatively impact future generations

How Can Debt Issuance Choices Address Sovereign Risks?



Debt Issuance Characteristics	Benefit
Nominal vs. inflation-protected bonds	Better match expenditures with costs and hedge inflation risk
Maturity of debt instruments issued	Manage and balance current vs. future interest costs
Currency of debt issuance (local vs. foreign currency)	Match the currency of expected flows
Transparency/communication with credit rating agencies	Manage the trade-off of debt rollover risk vs. higher cost certainty to maintain its credit rating

Balance Sheet Complexity Makes ALM Challenging for Sovereigns



The use of ALM to inform the management of sovereign balance sheet risk is more complex than other financial institutions for several reasons:

- Assets include non-financial assets such as land, as well as broad taxing powers
- Liabilities must include contingent liabilities such as entitlement programs and credit guarantees
- Balance sheet is carried at book value and/or replacement cost, rather than market as preferred by an ALM framework

The application of ALM to a sovereign is therefore more conceptual than quantitative

■ Conceptual sovereign balance sheet could contain:

■ Assets:

- ▶ Present value of future tax revenues
- ▶ Inventories, property, plant & equipment, infrastructure assets
- ▶ Non-financial assets (e.g. land)
- ▶ Cash, monetary assets, debt & equity securities

■ Liabilities:

- ▶ Present value of future government expenditures
- ▶ Loan and insurance guarantees, environmental liabilities
- ▶ Federal employee and veteran benefits payable
- ▶ Federal debt

■ Net Worth:

- ▶ Difference between current and future assets and liabilities

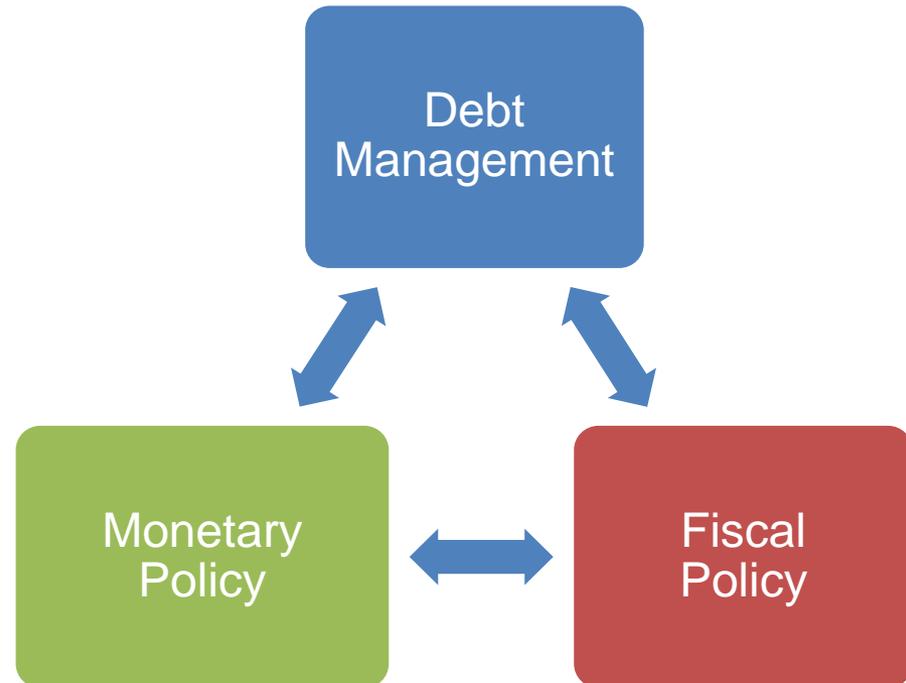
Interdependent Policymaking by Independent Entities Is a Complicating Factor in the U.S.



Independent fiscal, monetary and debt management policymakers decentralize balance sheet management and require coordination

This independence enhances policy credibility and improves implementation

- Debt Management and Monetary Policy
 - ▶ Issuance choices between fixed/floating and nominal/indexed debt is informed by the central bank's price stability mandate
 - ▶ Lack of policy independence could raise concerns regarding debt monetization
 - ▶ At the zero interest rate bound, quantitative easing in the form of debt buybacks may run counter to the desire to lengthen the debt maturity profile
- Debt Management and Fiscal Policy
 - ▶ Fiscal policymakers and government debt managers share common interest in sustainable debt strategy
 - ▶ Coordination is required in preparing government budget and fiscal projections
 - ▶ Independence is necessitated by the fact that fiscal excesses could temporarily be masked by a high risk short-term financing scheme



What Makes the U.S. Unique Among Sovereigns?



A comprehensive sovereign ALM solution for the U.S. is more complex than for other sovereigns:

- Unparalleled depth and breadth of Treasury market and role as a “flight to quality” instrument
- Interdependent policymaking structure limits direct Treasury control
- Size and complexity of the U.S. balance sheet
- USD is the global reserve currency; therefore the U.S. holds limited foreign currency reserves

While ALM principles can mitigate rollover risk, the considerable debate over the existence of that risk for the U.S. must inform any decision of whether and how to proceed with a broad application of ALM

- Negative T-bill yields demonstrate strong demand for short-term Treasuries despite elements of theoretical rollover risk

Application of ALM Framework to Student Loans

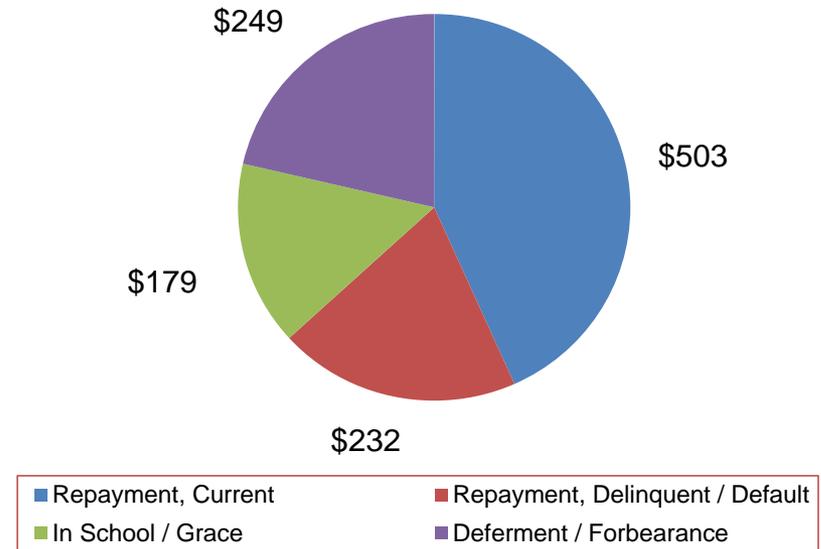




Why Consider ALM for Student Loans?

- The portfolio, at \$1.2 trillion today and growing by \$90 billion annually, is a large enough asset to affect the Treasury debt financing decision
- Characteristics of outstanding loans and repayment history are observable and can be tracked and modelled
- Student loans are subject to measurable and potentially hedgeable market risks

Student Loan Portfolio Status
(\$ Billions)



Source: Department of Education and presenter's calculations to combine FFEL and Direct Loan portfolios



What Risks Might ALM Address?

Risk	Description
Interest Rate	Present value of fixed rate student loans, if not financed by matching liabilities, is exposed to changes in interest rates
Cash Flow Timing	Current and projected cash flows are affected by idiosyncratic factors including prepayments, forbearance/deferment and income-based payment programs
Credit	Defaults and loss-given-default are impacted by cyclical economic factors, policy outcomes, potential for adverse selection and other borrower-specific risks



Student Loan Portfolio Characteristics

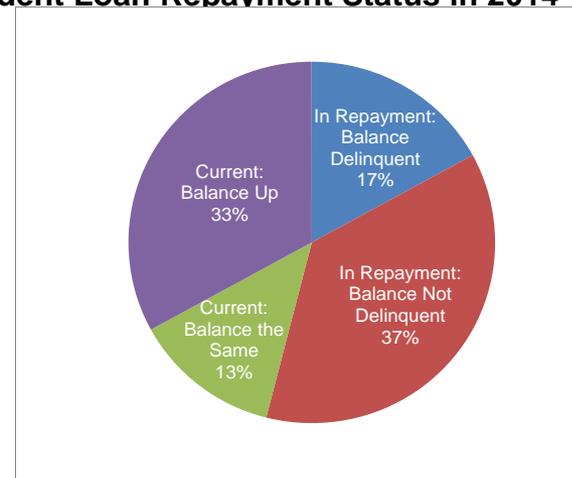
- Highly complex prepayment optionality
 - ▶ Within repayment status, borrowers can prepay, remain current, or fall into delinquency/default.
 - ▶ Borrowers can move in/out of repayment and from in-school, repayment, deferment and forbearance status
 - ▶ Repayment formulas often take borrower income as an input when determining repayment requirements

- Based on origination cohort data and the growth of the portfolio the tenor of the portfolio is estimated to have:
 - ▶ 76 month WALA
 - ▶ 101 month WAM (vs. 70 month WAM of Treasury debt)

- Borrowers struggle to remain current despite flexibility afforded them

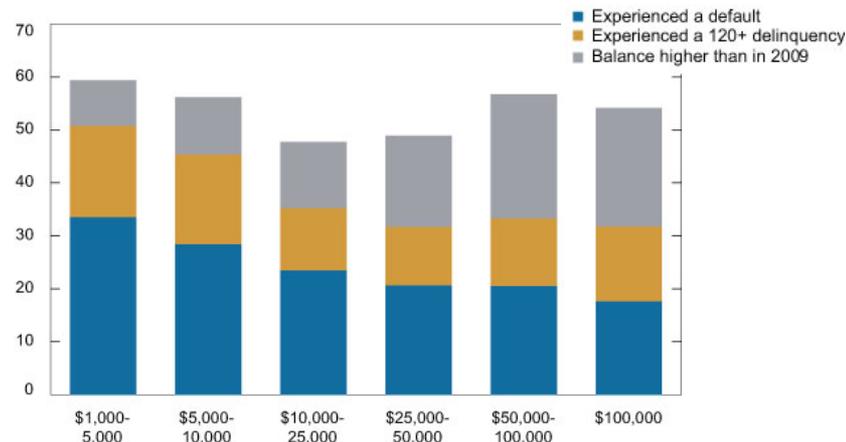
- Limited publicly available data complicates analysis

Student Loan Repayment Status in 2014



Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax

2009 Cohort: Troubled Borrowers by School-Leaving Balance (% as of 2014:Q4)



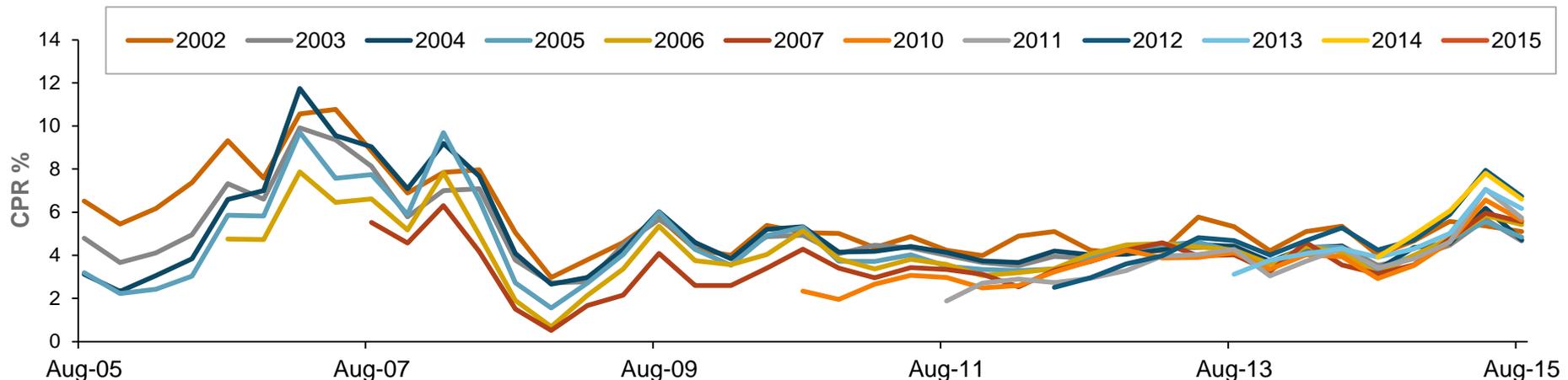
Source: Bank of New York Consumer Credit Panel/Equifax

Interest Rate and Cash Flow Timing Risk Can Be Hedged



- Initial interest rate hedging decision is relatively straightforward
 - ▶ Projected cash flows can be “matched” to a subset of regular Treasury issuance
- Ongoing cash flow hedging is more challenging and less precise
 - ▶ Actual cash flows will differ from projections due to borrower behavior and policy changes
 - ▶ Any current or anticipated deviation from projected cash flows would require an adjustment of the matched liabilities

Prepayment Rate by Cohort Year



Source: Investor reports, Nomura



Would Matched Issuance Be Predictable?

- The size and variability of required issuance should not undermine the regularity and predictability of the Treasury debt calendar
 - ▶ A 2% CPR prepayment decrease for the portfolio's life would extend duration by \$16.5 billion 10-year Treasury equivalents or less than 1 month of 10-year issuance
 - ▶ Cash flow forecast changes are likely to be gradual and impact multiple points on the Treasury curve, thereby spreading out any effect on issuance
- Transparent disclosure of the matched asset and liability portfolio and relevant debt management policy would enhance the predictability of Treasury issuance

Change in Dollar-Duration for a 2% Prepayment Decrease in CPR

1. Duration at 7% CPR	7.905
2. Duration at 5% CPR	8.038
3. Change in Duration = (2) - (1)	0.133
4. Size of Student Loan Portfolio (\$billion)	\$1,100.00
5. Change in Dollar-Duration of Student Loan Portfolio = (3) x (4)	\$146.30
6. Size of a 10-Year U.S. Treasury Portfolio with Same Dollar-Duration = (5) / (6) (\$billion)	\$16.53

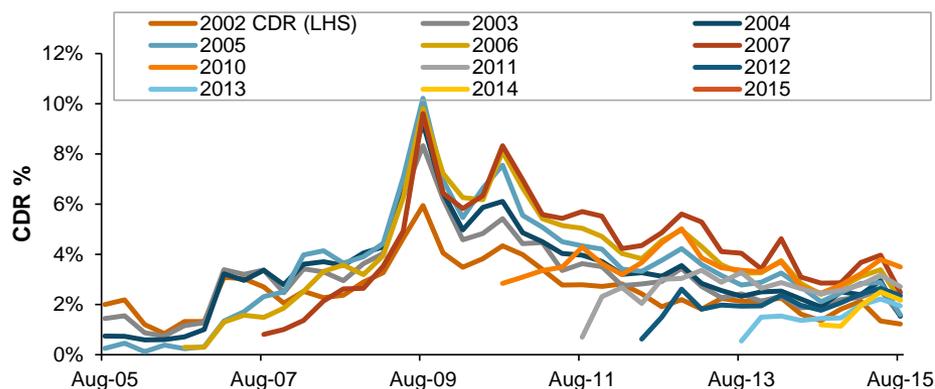


What Form Could Matched Issuance Take?

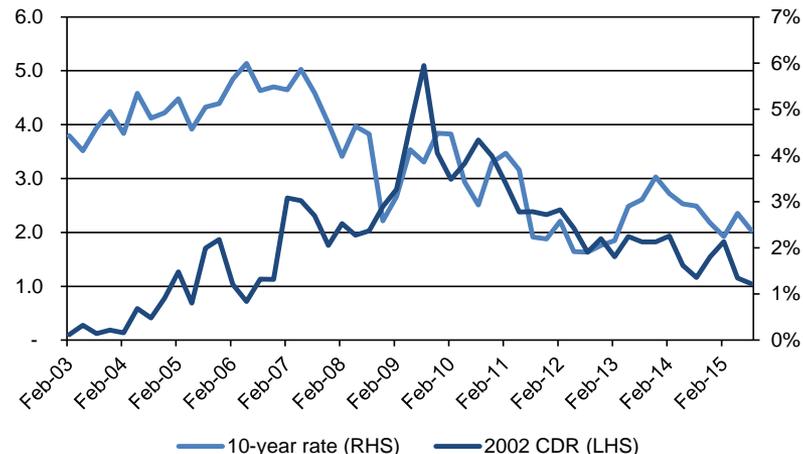
- Given that student loan cash flow variability is not strongly correlated with interest rates, Treasury debt issuance with embedded optionality (e.g. callables/putables) would not produce an efficient match
- A better approach would be to create a matched Treasury portfolio to balance against the current cash flow profile of the student loans and reassess on an ongoing basis

Funding Method	Description	Comments
Matched Treasury Portfolio	Issuance of Treasury debt at different maturities in response to cash flow assumption changes would deliver a durable asset-liability match.	To the extent that borrower and policy behavior is uncorrelated with interest rate changes, this strategy has no expected cost; segregation of matched vs strategic liability portfolios has been used with success by other sovereigns within an ALM framework.

Default Rate by Cohort Year



2002 cohort default rate vs. 10-year Treasury yield



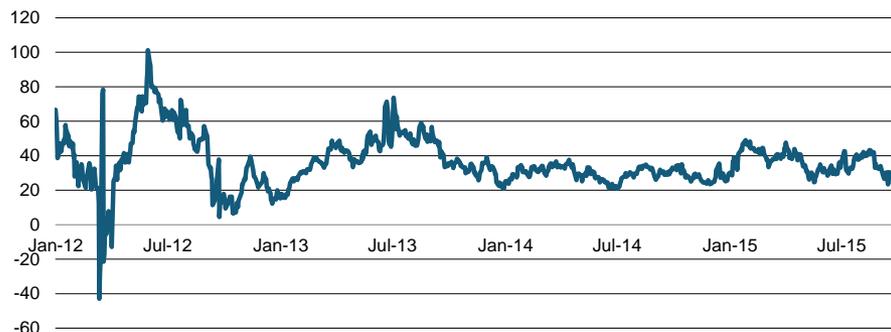


Another Choice: Student Loan Pass-throughs

Funding Method	Description	Comments
Pass-throughs	Pass-through issuance similar to the Agency MBS market could completely hedge interest rate and cash flow timing risk, while retaining credit risk on the sovereign balance sheet	Investors' appetite for such bonds would depend on factors including the size and regularity of issuance, explicit credit guarantee, and convexity risk to the extent prepayments correlate with changes in market interest rates

Program Cost Estimate: GNMA 30-year Option Adjusted Spread	Comments
<ul style="list-style-type: none"> GNMA 30-year OAS has averaged 0.36% since 2012 Total outstanding GNMA MBS amount at \$1.39tn is similar to the federal student loan portfolio but is tightly linked to the much larger conventional MBS market Gross spread of student loan pass-through would be similar to OAS if the correlation between prepayments and rates is small 	<ul style="list-style-type: none"> The varying coupons of the programs would require different tranches, diminishing the benefit of liquidity The market's desire for par priced securities would require Treasury to hold Interest only strips, adding complexity to Treasury's balance sheet The market charges a premium for cash flow uncertainty, increasing the cost. Treasury would be better off absorbing the cost of optionality and matching changes in cash flows via adjusting auction size.

G2SF CC Treasury OAS



G2SF CC Treasury ZV Spread

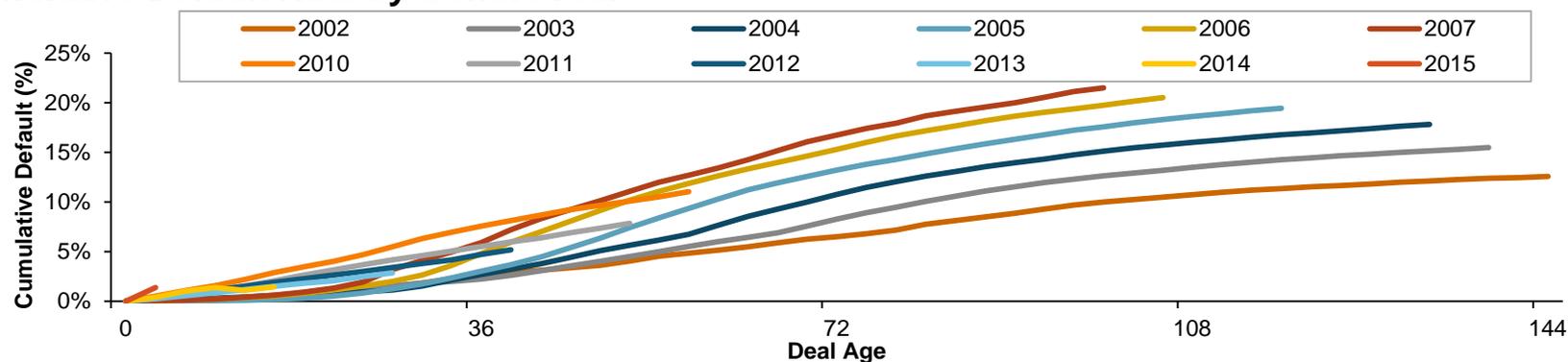




Credit Risk Can, But Should Not, Be Hedged

- Uncertainty surrounding student loan credit loss is high
- As expected, the cost of hedging credit risk is also high
 - ▶ Buyers of student loan credit risk would require compensation for expected defaults, default correlation with other market risks, and the asset's lower credit ratings and inferior liquidity compared to U.S. Treasuries
- Selling credit risk in a secondary market would conflict with the student loan program's policy objectives
- Cost of hedging credit risk in the market can be approximated by the difference between FCRA and fair-value accounting for the student loan subsidy
 - ▶ This yields an estimate of \$279 billion over 10 years, excluding expected credit losses

Cumulative Default Rate by Cohort Year





Summary Recommendations

- Application of ALM to the student loan portfolio is a practical first step towards any broader potential applications of ALM to the U.S. balance sheet
- Liabilities that fund the student loan portfolio can be segregated from general Treasury liabilities and actively managed to hedge interest rate risk and cash flow mismatches as they develop
- Segregating would make liability management consequences of student loan policy clear and transparent, informing policymakers of the cost to tax payers of cash flow modifications
- Cash flow volatility has no reliable correlation with interest rates, thus management of the matched Treasury portfolio is expected to deliver most of the possible ALM benefit at minimal cost
- Liabilities issued to hedge the student loan portfolio would have a longer WAM than the current Treasury average
- Credit risk hedging is cost prohibitive and counterproductive to the program's policy objectives

ALM for U.S. Conclusion & Questions



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