

## TBAC CHARGE QUESTION

April 2014

## Charge question May 2014

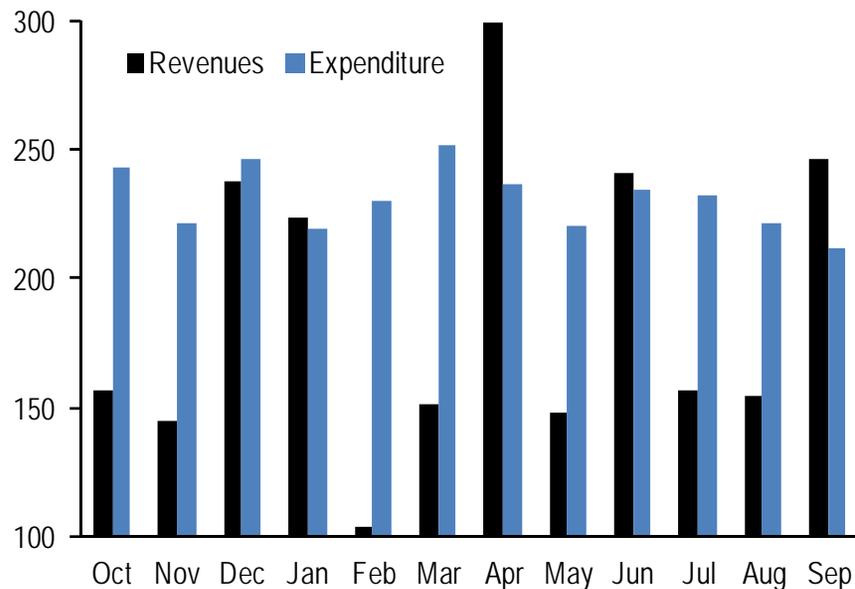
*As prudent debt managers, Treasury regularly considers ways to effectively manage potential risks associated with the Treasury portfolio. We would like the Committee's views on the effectiveness and practicality of the following (1) the use of buybacks to smooth the maturity profile, manage cash balances, and provide cost savings to the taxpayer; (2) modifications to the current auction schedule, particularly for 10- and 30-year securities, as a means of more evenly distributing Treasury's maturity profile; (3) optimizing the cash balance as a means of reducing operational and market access risk.*

## Executive Summary

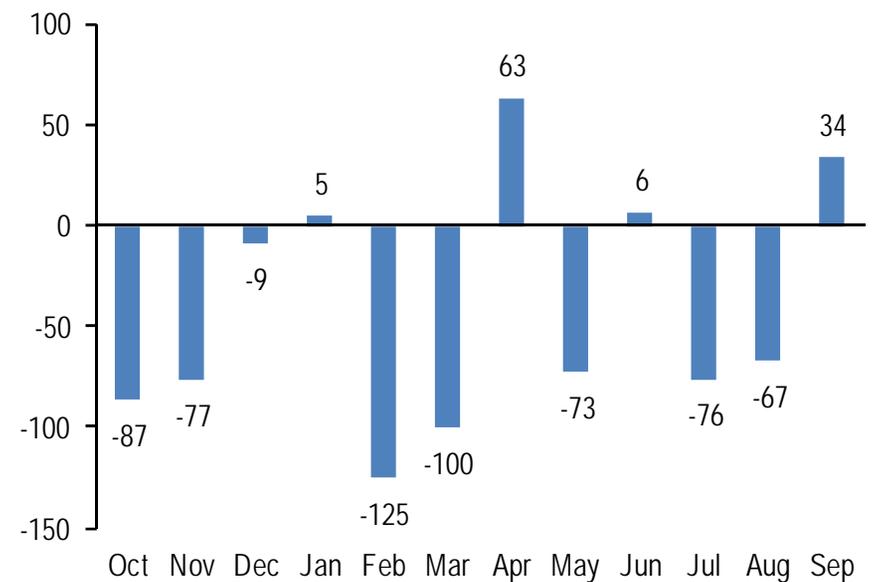
- Treasury's non-uniform issuance profile likely evolved in part due to intra-year variations in the primary deficit
- This has led to considerable seasonal variation in gross financing needs on a month-to-month basis, with the variation likely to worsen going forward. Fluctuations in financing needs are also highly variable on an intra-month basis
- Short term bill issuance is typically used as a smoothing tool. Fluctuating bill supply does not appear to add to Treasury's funding costs on average through the cycle
- Heavy seasonal issuance results in elevated reliance on market access around select dates and therefore increased operational risk in the event of an extended market shutdown
- Treasury has a host of potential solutions for mitigating market access risk
  - Structurally increase the size of Treasury's operating cash balance
  - Modification to auction schedules
  - Make use of buybacks in order to manage seasonal variation in financing needs

Treasury's non-uniform issuance profile likely evolved in part due to intra-year variations in the primary deficit

Average monthly revenues and expenditures (excluding interest expense); average of FY02-FY13; \$bn



Average monthly primary deficit\*; average of FY02-FY13; \$bn

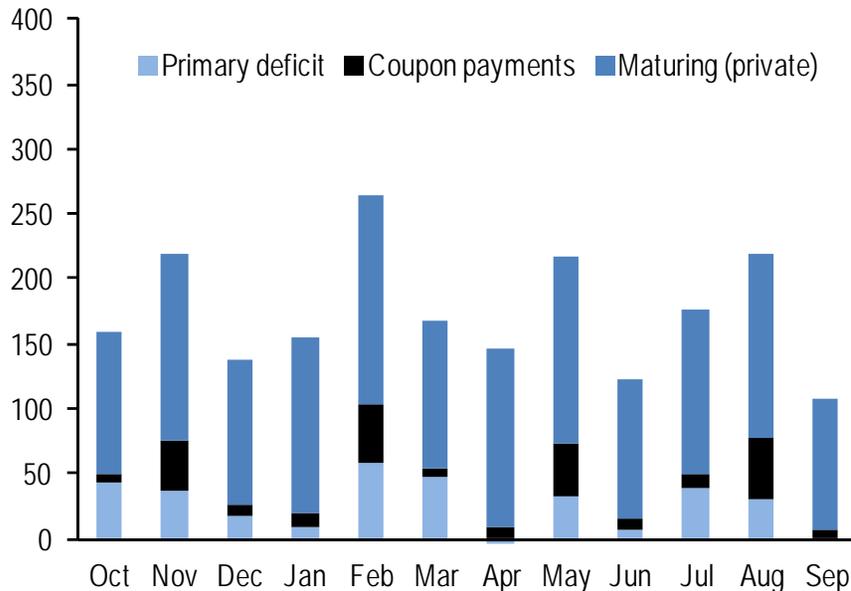


\* Primary deficit is revenues less expenditures, excluding interest payments

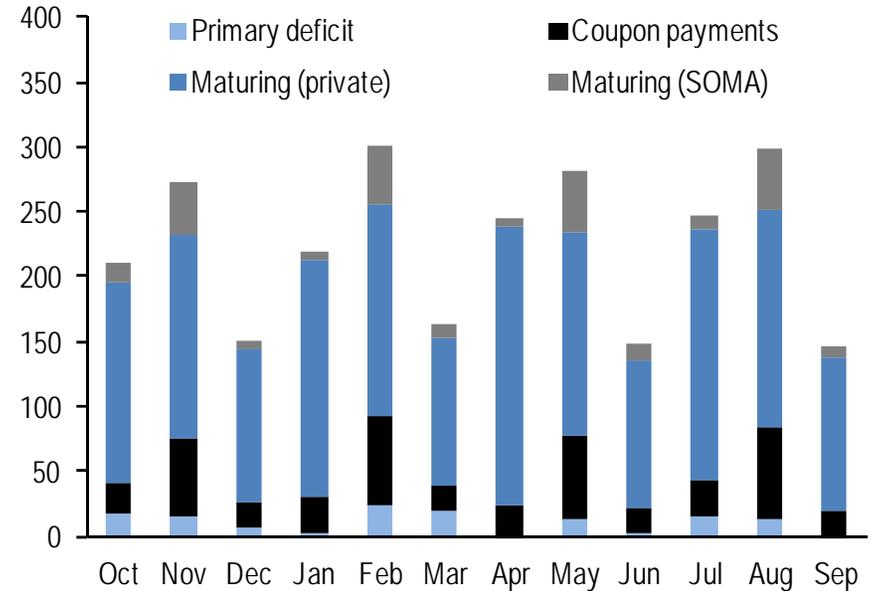
- Expenditures (excluding interest payments) exhibit only limited variability between months
- Revenues are much noisier, driven by quarterly corporate tax receipts, estimated individual tax payments, tax refunds paid in February/March, and April tax receipts

This has led to considerable seasonal variation in gross financing needs on a month-to-month basis, with the variation likely to worsen going forward

Treasury's projected monthly gross financing needs (excluding bills)\* in FY 2015; \$bn



Treasury's projected monthly gross financing needs (excluding bills)\* in FY 2020; \$bn



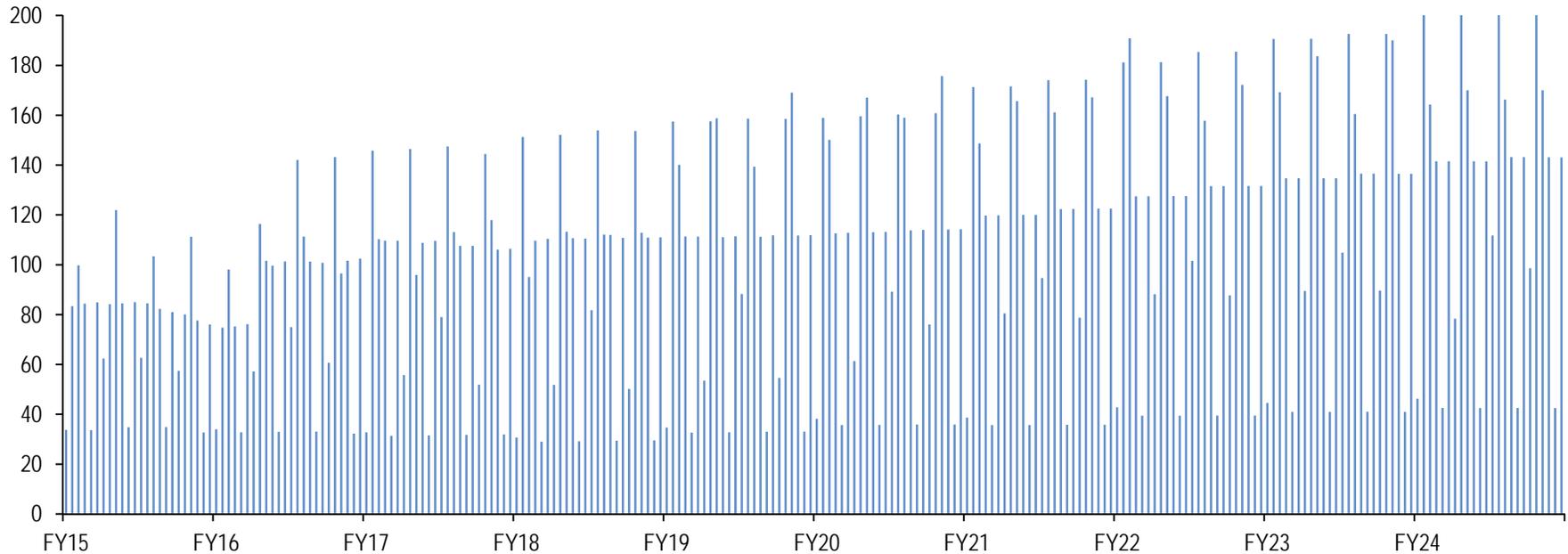
- Intra-year variation in Treasury's gross financing needs are driven by the following sources.
  - Swings in primary deficits
  - Seasonal variation in interest payments on Treasury debt
  - Seasonal variation in maturity schedule of Treasury debt; in particular, quarterly maturities of 10-year notes and 30-year bonds in February, May, August and November, as well as TIPS maturities in January, February, April and July
- If not addressed, this intra-year variation will become more pronounced in the future, driven by the existing maturity structure of Treasury debt - the peak month-over-month variation in gross financing needs increases from \$115bn in FY15 to \$154bn by FY20
- Should the Fed cease reinvestments of maturing Treasuries, that would serve to amplify the variation in private market financing

\* Decomposes monthly gross financing needs into primary deficits, coupon payments and maturing principal of Treasury securities. Primary deficits based off April 2014 CBO *Analysis of the President's Budget*, table 2 and seasonality of primary deficit from FY2002-FY2013  
 Projections for beyond FY14 assume bill percentage of marketable debt is held constant at 11.8%. Assumes nominal coupon-bearing Treasuries and TIPS are increased pro-rata to meet residual financing needs, financed at forward rates.

Source: US Treasury, CBO

## Fluctuations in financing needs are also highly variable on an intra-month basis

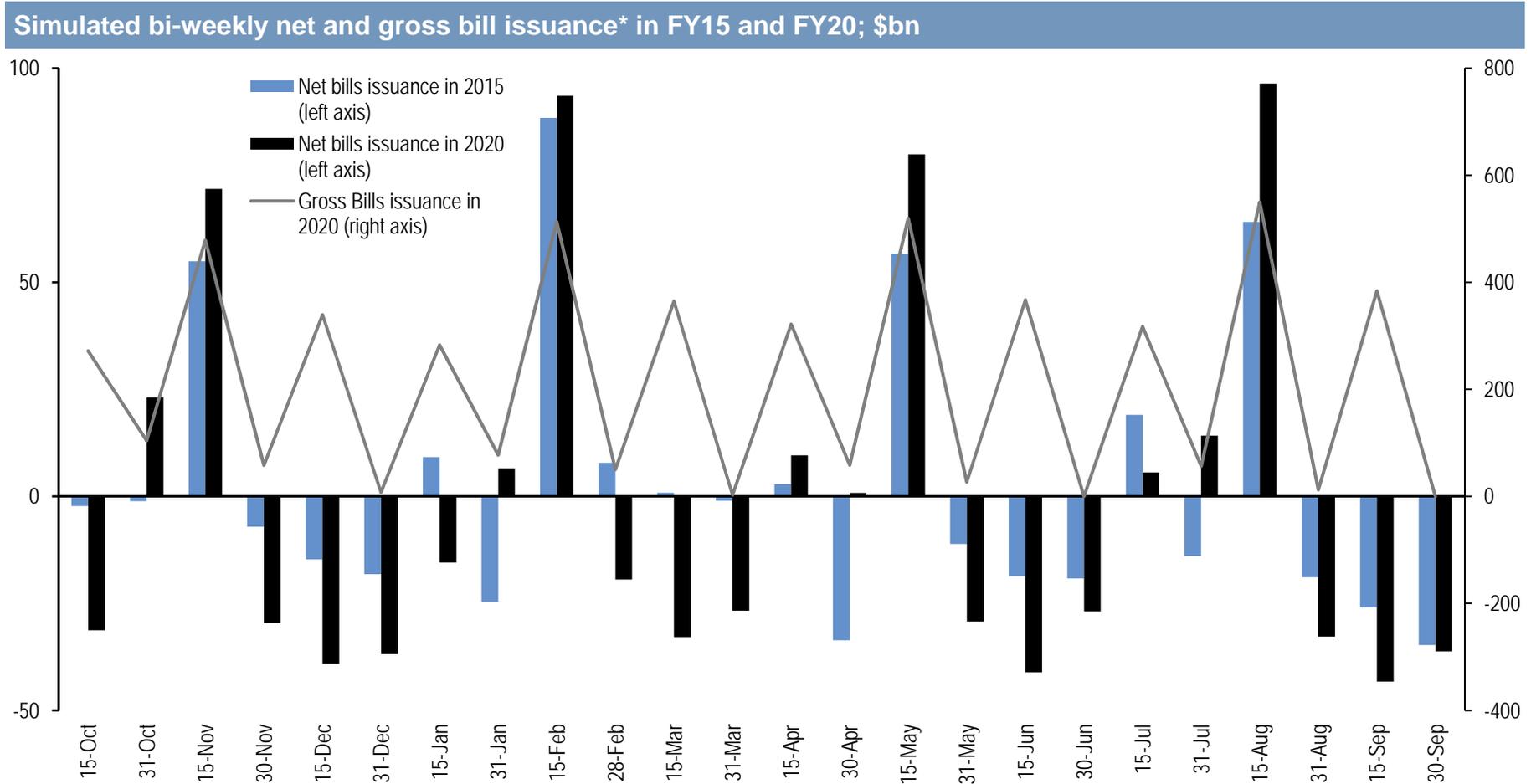
Projected bi-weekly coupon payments and maturing private/SOMA principal\* (excluding bills); \$bn



\*Assumes nominal coupon-bearing Treasuries and TIPS are increased pro-rata to meet residual financing needs. Projections for beyond FY14 assume bill percentage of marketable debt is held constant at 11.8%.

- As already noted, the monthly variation in Treasury's coupon and maturity profile is highly volatile. Furthermore, this variation exists on an intra-month basis as well
- This intra-month variation is projected to increase through time as shown above

## Short term bill issuance is typically used as a smoothing tool



\* Assumes a constant cash balance. Simulations assume bill percentage of marketable debt is held constant at 11.8%.

- As the stock of Treasury's debt rises in the future the intra-year and intra-month variation in gross financing needs will increase. Accordingly, the seasonal variation in net and gross bill issuance will increase as well
- Both variations in regular T-bill issuance and cash management bills (CMBs) are used to smooth out this seasonality in gross financing needs

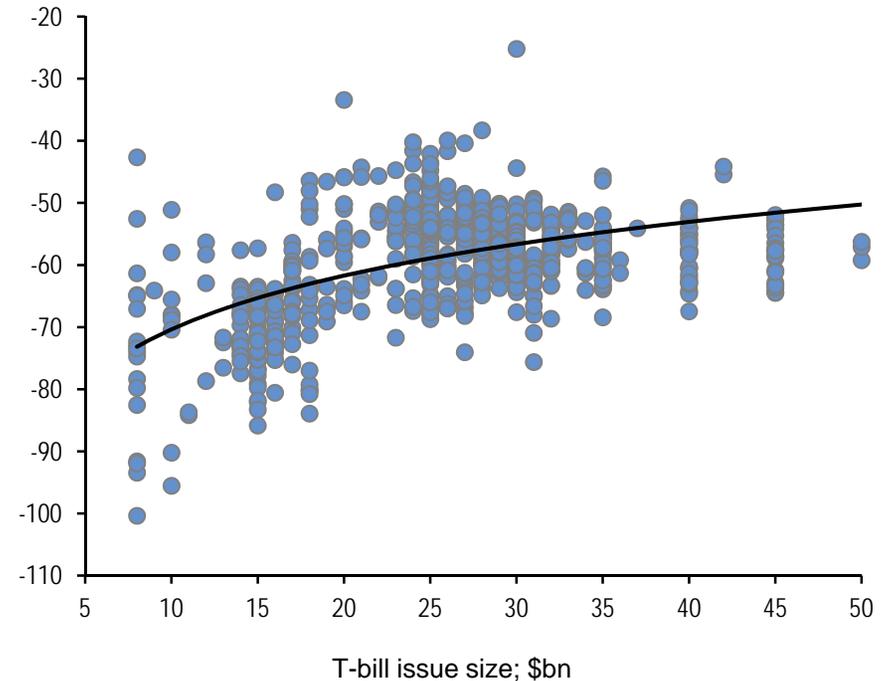
Fluctuating bill supply does not appear to add to Treasury's funding costs on average through the cycle; the sensitivity of bill yields to issue size declines as issue sizes increase

Statistics from regressing historical T-bill/OIS spreads (%), versus (1) the natural log of auction size (\$bn) and (2) the aggregate stock of T-bills (\$bn)

	Coeff	T-stat
Log of Issue Size (bn)	0.12492	13.1
Stock (\$bn)	0.00031904	29.5
Intercept	-0.99	-43.9
R <sup>2</sup>	78	

\* Data from all non-CMB bill auctions over 2006-current, but excluding 04/2007 – 12/2009.

T-bill/OIS spreads at close on day of auction, adjusted for the stock of bills outstanding, versus issue size; bp



- Adjusted for the stock of bills, spreads versus OIS at close on auction day exhibit diminishing sensitivity to issue size as issue size increases. Holding the stock of bills constant, starting at an issue size of \$25bn, a \$10bn increase in issue size tends to cheapen Treasury bills by 5bp relative to OIS. This sensitivity declines to 3bp per each \$10bn size increase, if issue sizes reach \$40bn
- Thus, while the overall growth in issuance in the bill sector would bias Treasury's funding costs higher, there is no evidence seasonal variation in sizes are likely to prove detrimental from a funding cost standpoint

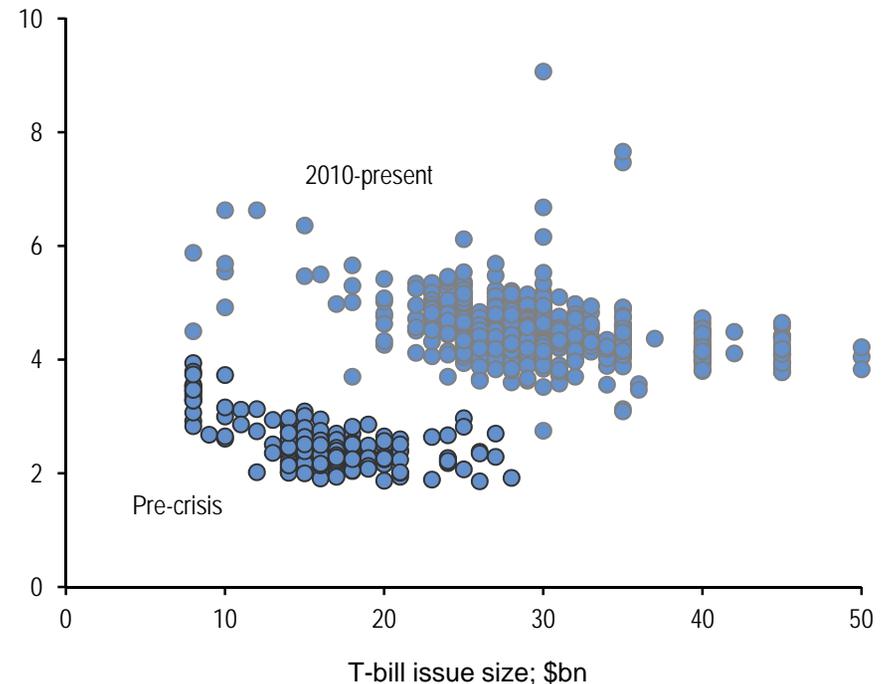
... but there is some evidence that bid-to-cover ratios drift lower when gross issuance sizes are large

Statistics from regressing historical T-bill bid-to-cover ratios versus (1) auction size (\$bn) and (2) the aggregate stock of T-bills (\$bn)

	Coeff	T-stat
Issue Size (bn)	-0.0135	-3.9
Stock	0.00283	32.2
Intercept	0.22	2.23
R <sup>2</sup>	63.8	

\* Data from all non-CMB bill auctions over 2006-current, but excluding 04/2007 – 12/2009.

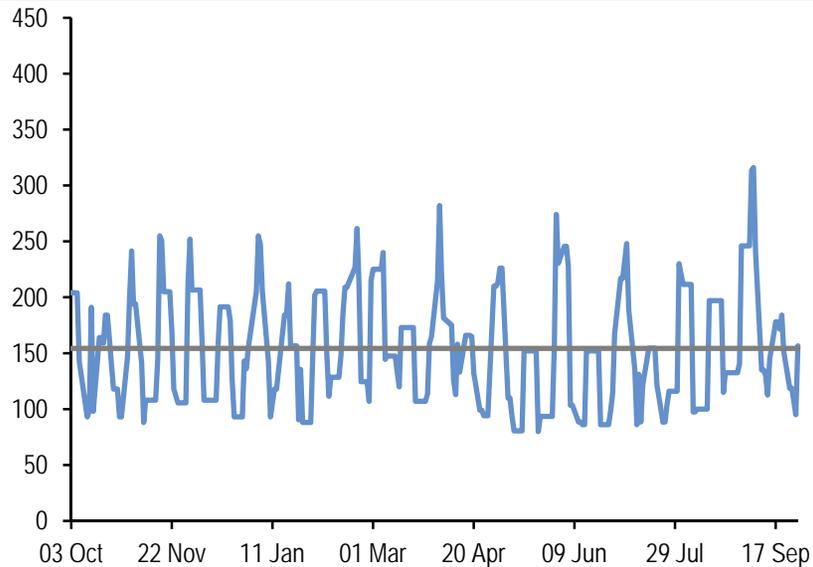
Bid-to-cover ratios versus issue size; ratio



- Empirical work suggests larger issue sizes in bills are coincident with lower bid-to-cover ratios. Holding the stock of Treasury bills constant, each \$10bn increase in issue size leads to a 0.13 decline in bid-to-cover ratios
- This suggests that considerable increases in bill auction sizes could pose some operational risk in the event that it causes bid-to-cover ratios to fall. However, given the current high level of coverage ratios, auction sizes would have to more than quadruple for bid-to-cover ratios to fall closer to 1

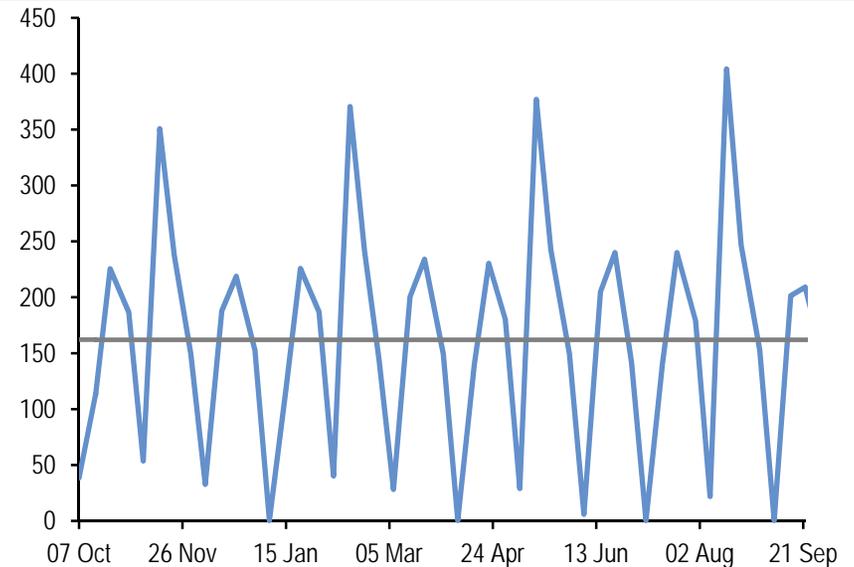
Heavy seasonal issuance results in elevated reliance on market access around select dates and therefore increased operational risk in the event of an extended market shutdown

**Rolling weekly total of Treasury gross issuance; average over FY12-13\*; \$bn**



\* Includes bills, notes, bonds, TIPS and FRNs. Projections assume bill percentage of marketable debt is held constant at 11.8%.

**Simulated rolling weekly total of Treasury gross issuance in FY20\*; \$bn**



\* Includes bills, notes, bonds, TIPS and FRNs. Assumes constant cash balance. Projections assume bill percentage of marketable debt is held constant at 11.8%.

- Gross issuance has averaged approximately \$154bn per week over FY12-FY13 with a 5-day peak of \$316bn
- On a simulated basis this grows through time: in FY20, gross issuance will average approximately \$162bn per week with a 5-day peak of \$404bn
- This brings heightened operational risk: if Treasury loses market access at any point due to an extended market shutdown, it runs the risk, albeit remote, of a potential technical default
- While this risk is relatively small, the political risk of such loss of market access can outweigh the monetary costs to Treasury

In recent history, Treasury has lost market access for up to 3 days

**Unforeseen and tragic incidents have disrupted regular market operations in the past, leading to market access risk for Treasury**

Incident	Disruption dates	# of days	Description	Auctions affected and sizes
September 11 attack	Sep 11, 2001 (market fully closed) Sep 12, 2001 (market fully closed) Sep 13, 2001 (open w/ limited trading)	2-3	Bond markets were closed on Sep 11 and Sep 12, and reopened with extremely limited trading on Sep 13 (equities were closed until Sep 17).	\$10bn 4-week bill auction Sep 11, 2001 was rescheduled for Sep 12, 2001 and then finally cancelled
Super storm Sandy	Oct 29, 2012 (market closed early) Oct 30, 2012 (market fully closed)	1.5	Bond markets were closed for a day and a half – it closed early on Oct 29, 2012 and was fully closed on Tuesday Oct 30. (Note: Fed was open, so settlements could occur)	\$25bn 4-week bill auction brought forward from Oct 30, 2012 to Oct 29, 2012
TAAPS (Treasury auction system) IT Issue	Dec 2, 2013 (auction postponed)	1	The noncompetitive and competitive portion of the 13- and 26-week bill auctions, originally scheduled to close on Dec 2, had to be rescheduled to the next day due to an error that occurred during a test of Treasury's auction system. Settlement date remained unchanged.	\$32bn 13-week bills and \$27bn 26-week bills postponed from Dec 2, 2013 to Dec 3, 2013

## Treasury has a host of potential solutions for mitigating market access risk

### Potential solutions

#### *Mitigating average market access risk*

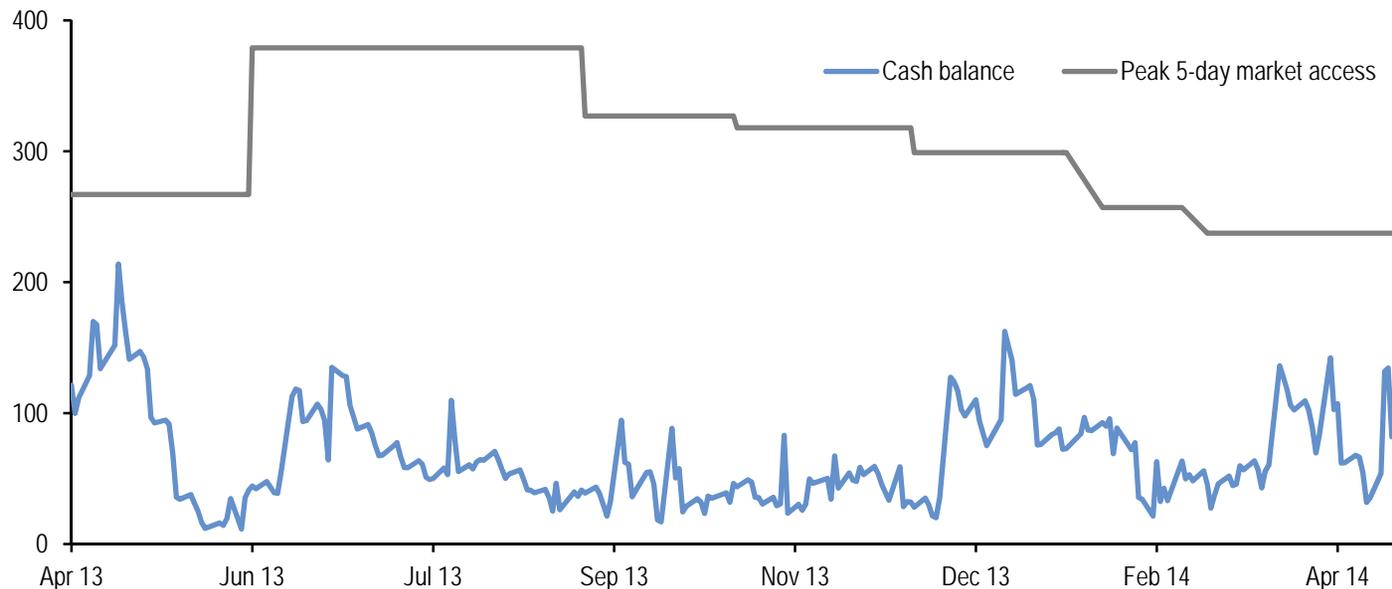
- Structurally increase the size of Treasury's operating cash balance

#### *Mitigating peak market access risk*

- Move from quarterly 10-year notes and 30-year bonds to monthly new issues
- Shift maturities into non-refunding months from refunding months
  - This can be done, for instance, by auctioning new-issue 3s on a quarterly Mar/Jun/Sep/Dec cycle, with re-openings in other months
  - Such an approach is scalable, and can begin to mitigate the seasonal variation in a shorter time frame – modifying 3-year issuance now will begin to bear fruit in 3 years
- Make use of buybacks in order to manage seasonal variation in financing needs

## Treasury can permanently increase its operating cash balance to mitigate market access risk

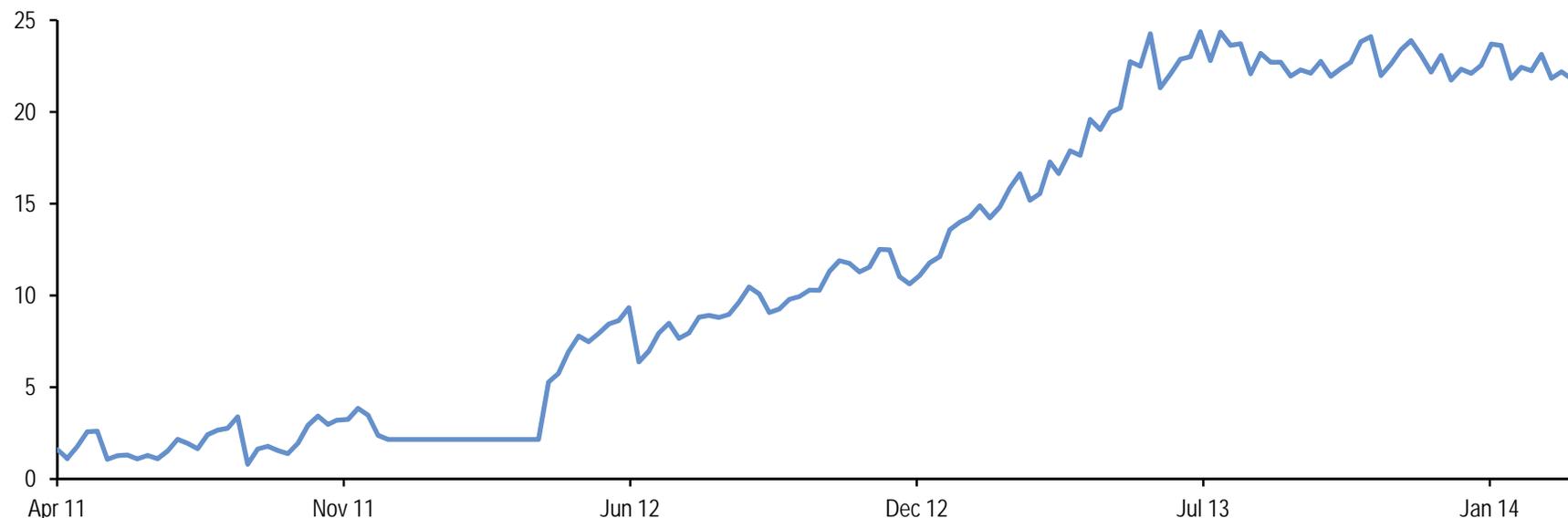
Treasury operating cash balance and forward rolling 3-month peak 5-day gross financing need; \$bn



- While the Treasury market has not been closed for more than 2-3 days in a row in the past, we believe a 5-day liquidity buffer may be prudent
- Increases in Treasury's operating cash balance at the Fed reduces reserves balances, and hence lowers the aggregate amount of interest on reserves paid. Provided Treasury bill yields are lower than or equal to IOR, funding this increased cash balance will have no cost (or negative cost) to Treasury. If funded with term debt, the cost to Treasury over time will be the term premium
- Treasury can design the liquidity buffer to meet average, peak, or time-varying gross issuance needs. How Treasury decides to fund this buffer will have impacts on gross issuance patterns in the future

## Internationally, other countries make use of liquidity buffers

### Government of Canada cash deposits at Bank of Canada; C\$bn

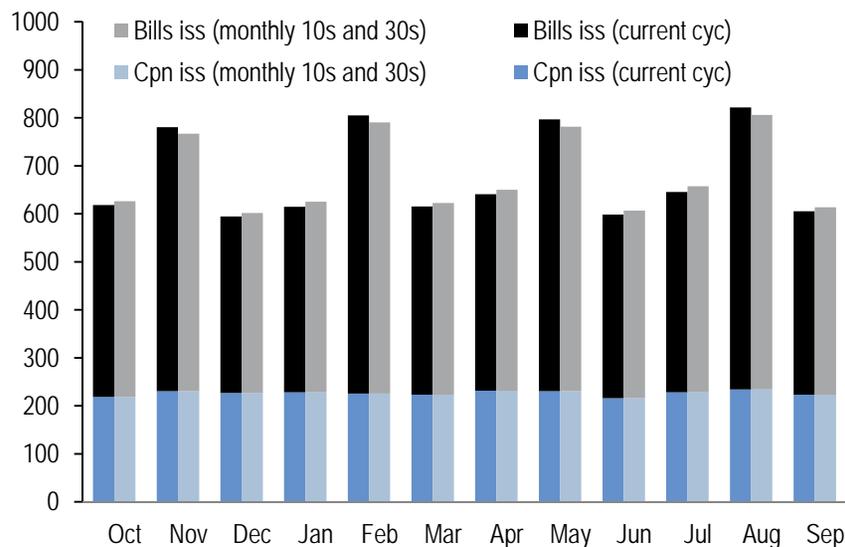


Source: Bank of Canada

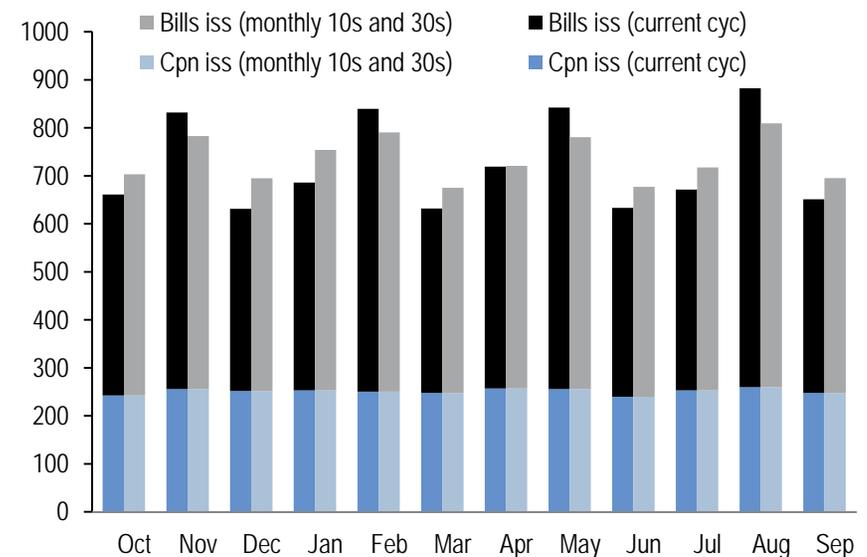
- The Government in Canada announced changes to its debt management strategy in 2011, aiming to borrow an additional \$35bn and structurally increase its cash balance in order to mitigate market access risk: “To improve prudential liquidity management, over the next three years, the Government will borrow an additional amount of \$35 billion to safeguard its ability to meet payment obligations in situations where normal access to funding markets may be disrupted or delayed. This financing activity will have no material impact on the budgetary balance or the federal debt as the cost of the additional borrowing will be offset by a corresponding increase in returns on interest-bearing assets.” (Source: Government of Canada, *Budget 2011, Debt Management Strategy for 2011-2012*, 6/6/11)
- In addition, Canada employs three types of buybacks: cash management, regular and switch-based buybacks. In particular, “cash management buybacks program helps to manage the government’s cash requirements by reducing the high levels of government cash balances needed on key coupon and maturity payments dates. This program also helps to smooth variations in the issuance of treasury bills over the year.” (Source: Bank of Canada, *Details on Bond Buyback Operations*, 4/2/12)
- Further work should be undertaken to see whether other developed market debt management offices maintain liquidity buffers or have access to liquidity facilities with their respective central banks

Treasury can increase the frequency of new issue 10-year notes and 30-year bonds from quarterly to monthly - this would reduce the seasonal variation in financing needs modestly, but not materially for a decade...

**Projected monthly gross issuance of Treasuries\* (including FRNs and T-bills) in 2020, under current issuance plan as well as modified issuance plan that uses monthly 10- and 30-year maturities; \$bn**



**Projected monthly gross issuance of Treasuries\* (including FRNs and T-bills) in 2025, under current issuance plan as well as modified issuance plan that uses monthly 10- and 30-year maturities; \$bn**



\* Decomposes monthly gross financing needs into primary deficits, coupon payments and maturing principal of Treasury securities. Primary deficits based off April 2014 CBO *Analysis of the President's Budget*, table 2 and seasonality of primary deficit from FY2002-FY2013. Projections for beyond FY14 assume bill percentage of marketable debt is held constant at 11.8%. Assumes nominal coupon-bearing Treasuries and TIPS are increased pro-rata to meet residual financing needs. Baseline case uses current issuance schedule financed at forward rates, alternate uses monthly 10- and 30-year maturities.

Source: US Treasury, CBO

- Monthly new issues will immediately help to smooth monthly coupon payment concentration, but this impact is relatively small (for example, in 2020, the projected reduction in peak issuance during refunding months is ~ \$15bn)
- Monthly maturities of 10-year notes and 30-year bonds will reduce seasonal variation further beginning a decade from now (in 2025, the projected reduction in peak issuance during refunding months is ~ \$58bn)

... and this approach risks higher average funding costs due to a lower liquidity premium

Yield error on current issue less yield error on old issue for various on-the-run issues, averages over 1-, 3-, and 5-years

Sector	New issue frequency	1y avg	3y avg	5y avg
2s	Monthly	-0.2	-0.5	-0.4
3s	Monthly	-0.8	-0.5	-0.2
5s	Monthly	-0.4	-0.3	-0.4
7s	Monthly	0.0	0.0	0.0
10s	Quarterly	-1.3	-1.5	-2.3
30s	Quarterly	-0.3	-0.4	-0.5

\*Yield error is actual yield less model yield derived from par fitted Treasury curve

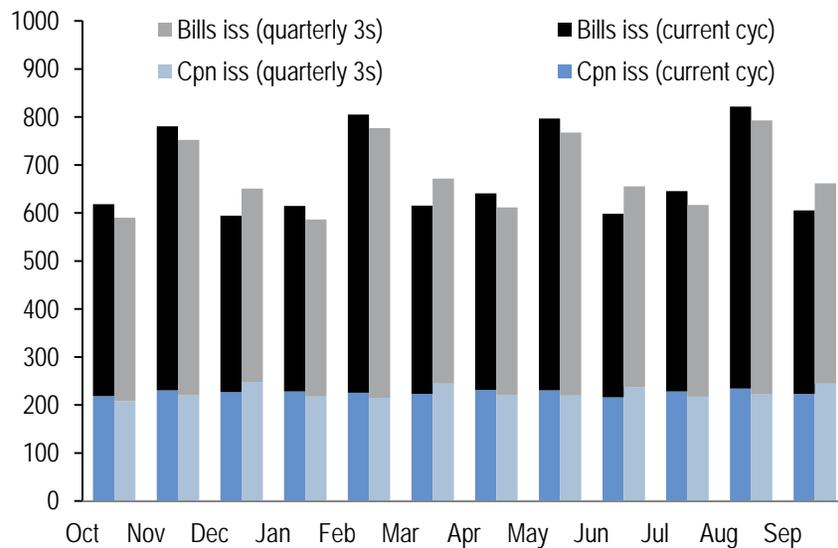
Yield error on current 5-year less yield error on old 5-year, under four different auction cycles

Years	New Issue cycle	Reopened	Yield error spread (bp)
1999	Quarterly		-5.7
2000-2001	Semiannual	Quarterly	-6.0
2002	Quarterly		-2.8
2003-present	Monthly		-0.6

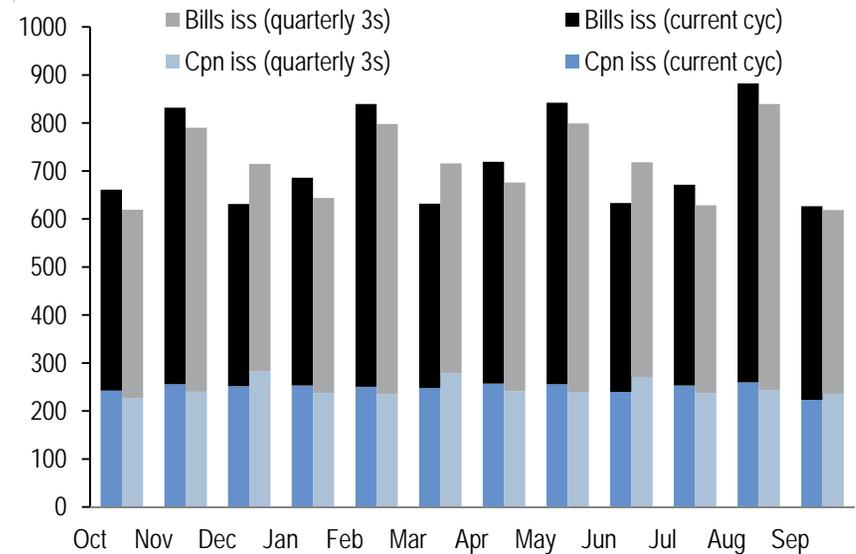
- Over the last five years, quarterly maturity 10-year notes and 30-year bonds have enjoyed substantially higher liquidity premium when compared to 2-, 3-, 5-, and 7-year notes, which have been auctioned with monthly new issues
- 5-year notes enjoyed a substantially larger liquidity premium when they were auctioned under a semiannual or quarterly cycle than under a monthly cycle
- 21% of the most recent off-the-run 30-year bonds are held in stripped form, or about \$9.1bn per issue. If Treasury moves to monthly new issues, this could reduce the tradable float of 30-year issues as they become off-the-run, potentially reducing liquidity

Alternatively, Treasury can issue 3-year notes on a Mar/Jun/Sep/Dec cycle with reopenings in subsequent months: this reduces the intra-month variation more quickly versus moving to monthly 10-year notes and 30-year bonds

**Projected monthly gross issuance of Treasuries\* (including FRNs and T-bills) in 2020, under current issuance plan as well as modified issuance plan that uses quarterly 3-year notes reopened monthly; \$bn**



**Projected monthly gross issuance of Treasuries\* (including FRNs and T-bills) in 2025, under current issuance plan as well as modified issuance plan that uses quarterly 3-year notes reopened monthly; \$bn**

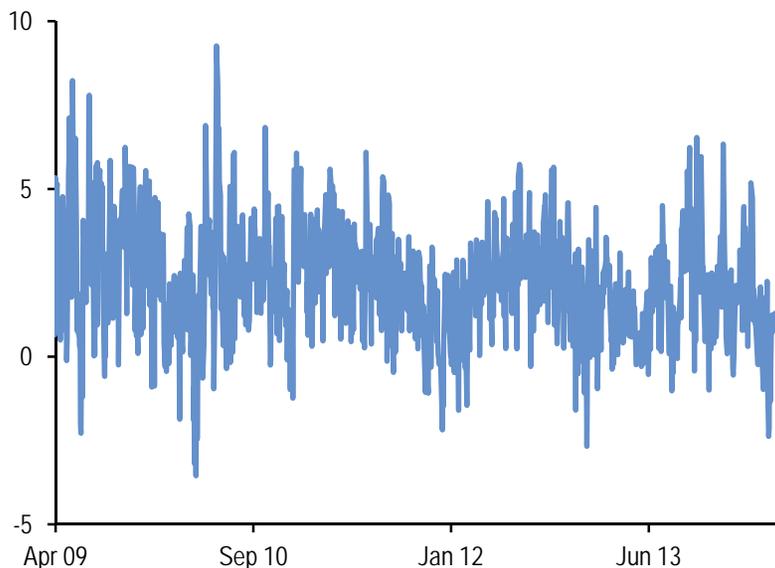


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 Source: US Treasury, CBO

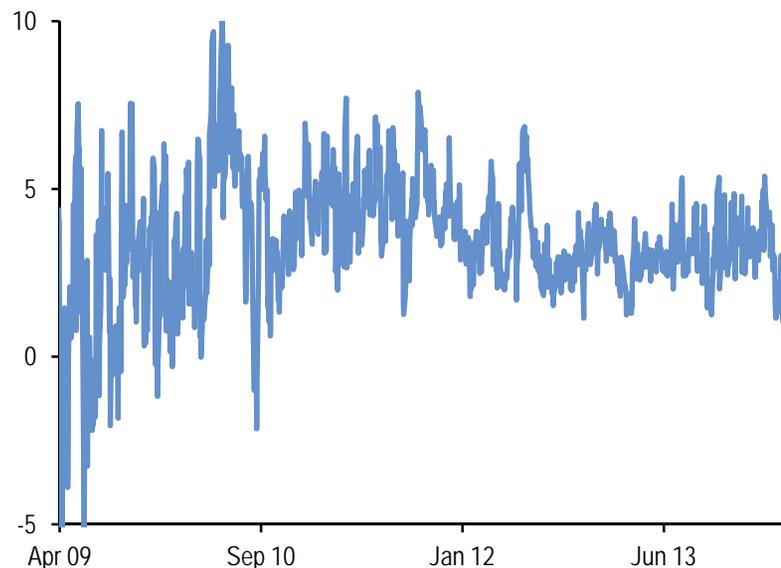
- Moving to quarterly 3-year notes that mature in March, June, September and December, with reopenings in following months, will help reduce peak financing needs in refunding months. This move will reduce projected peak issuance during refunding months by ~ \$30bn in 2020 and ~ \$42bn in 2025
- This strategy should be more beneficial in reducing intra-year variation compared to monthly new issues of 10s and 30s in the near term. In FY20, quarterly 3-year notes reduces peak issuance during refunding months by ~ \$15bn more compared to the alternate strategy. However, in FY25, this strategy reduces peak issuance during refunding months by ~ \$16bn less compared to the alternate strategy

Treasury can utilize different buyback strategies in order to smooth peaks, manage near-term cash balances, as well as take advantage of relative value

3-month Treasury coupon matched-maturity OIS spread less 3-month Treasury bill matched-maturity OIS spread; bp



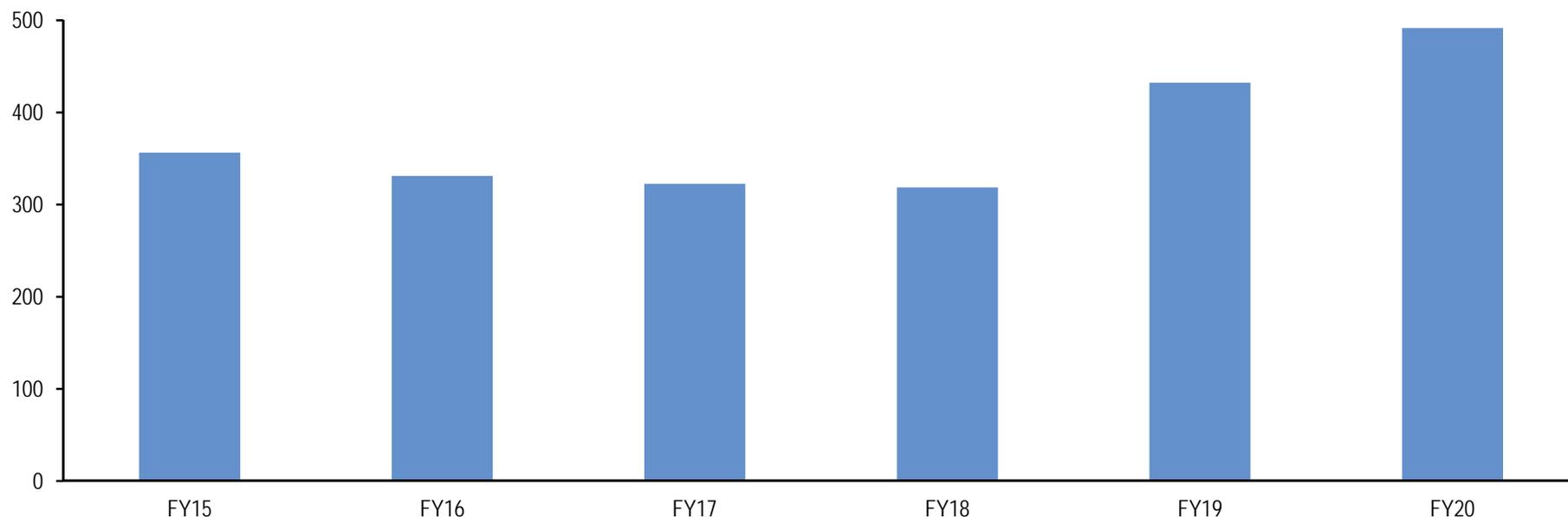
1-year Treasury coupon matched-maturity OIS spread less 1-year Treasury bill matched-maturity OIS spread; bp



- Given projected overfunding through FY15, buybacks are another option for Treasury to smooth peaks. For every \$10bn in monthly buybacks, the average refunding month peak issuance will be reduced by ~ \$30bn
- Treasury can employ a number of buyback/switch strategies:
  - **Short-term facility:** Treasury uses excess cash balances to buy back near-maturity Treasuries. Off-the-run notes at the front end of the curve have traded 2bp cheap, on average, relative to matched-maturity Treasury bills over the past 5 years
  - **Medium-term facility:** Treasury attempts to smooth funding costs in the future. Under the current auction schedule, Treasury is overfunded by more than \$200bn for FY15 and can purchase 1-year off-the-run coupons more cheaply than it currently auctions 1-year bills; over the last 5 years, coupons have traded more than 3bp cheap to bills in the 1-year sector
  - **Standing switch facility:** Treasury buys issues with Feb/May/Aug/Nov maturities which trade cheap to the curve in order to actively manage seasonal variation in financing needs. If market participants understand the Treasury's focus on relative value, they may prematurely richen issues where Treasury would likely focus and reduce the value in this strategy

While buybacks can make an immediate difference, the scale needed to fully offset peaks will be large

Buybacks/switches needed in each fiscal year to fully neutralize seasonal variation in financing needs\*; \$bn



\* Seasonal variation is the difference between peak monthly issuance and the average monthly issuance in each quarter; this sums the seasonal variation in each quarter of the fiscal year.

- Buybacks would help manage Treasury's seasonal variation in gross financing needs, while also maintaining larger new issue auction sizes
- Treasury has made use of buybacks before: it repurchased \$67.5bn between 2000 and 2002 to address steadily declining Treasury financing needs. These purchases were largely focused in the 10-year and longer sector against the backdrop of the potential for longer-term budget surpluses and this represented approximately 2% of publicly held Treasury debt
- Monthly purchases averaged approximately \$2.5bn between March 2000 and April 2002
- In order to reduce volatility between peak market access needs versus projected annual averages, Treasury will need to purchase ~ \$90bn securities per quarter in FY15, and this rises to ~ \$125bn per quarter in FY20.

Treasury has a number of options to mitigate market access risk, but each are accompanied with benefits and costs

### Summary of benefits and costs of potential solutions

Potential solution	Benefits	Costs
Increase the size of operating cash balance	Mitigates average market access risk	Could produce a small cost if bills yield more than IOR or if term premium is positive
Monthly new issue 10-year notes and 30-year bonds	Reduces seasonal variation in gross financing needs	Most benefits begin to accrue after 10 years Reduces liquidity premium in on-the-run issues
Shift 3-year note maturities from refunding months to Mar/Jun/Sep/Dec with re-openings in subsequent months	Reduces seasonal variation in gross financing needs more quickly	Results in very large-sized 3-year note issues
Make use of buybacks	Reduces fluctuations in gross financing needs over the course of a fiscal year Enhances market liquidity	Scale needed is very large