Public Expenditure Management Peer Assisted Learning

# PEMPAL-Treasury COP

# The Target Cash Buffer: its Importance, Calculation and Implementation

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WORLD BANK GROUP

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# Outline

- The Cash Buffer: what it is, why we need it
- Determining the Buffer and its Components
- International examples
- Some Issues Arising

# Why do we need a Cash Buffer?

**What is the Cash Buffer?**

- "The minimum level of cash balances to be sure of meeting day to day cash requirements, at all times, under all circumstances, taking into account the availability of other liquid resources"

**Why do we need it?**

- To meet day to day volatility
- To cope with forecasting errors
- To tide over times of financial stress or crisis

# New Risks

## Need for cash buffers long understood; but the Global Financial Crisis (& Covid) drew attention to

- Risk that domestic markets (not only FX markets) can dry up
  - Liquidity risk; activity in the interbank (especially) and repo markets fell
- Several countries increased their cash buffer post-GFC (especially in Europe)
- Recognised importance of a “financing continuity plan”
  - Cash buffers are part but only part of this

## Note: cash buffer is separate from structural surpluses

- Cash managers control cash or investments needed in the short-term [<3 months?]
- Sums above the cash buffers, not part of management of daily fluctuation, should be managed separately (or used to repay debt)
  - Subject to different criteria, with different managers & different governance framework
- May still be cost-effective to borrow to manage cash volatility (and wider benefits to money market)

# Outline

The Cash Buffer: what it is, why we need it

**Determining the Buffer and its Components**

International examples

Some Issues Arising

# Two Types of Cash Buffers

**Usually both a transaction buffer and a safety [or precautionary or market] buffer are necessary**

Transaction buffer must be sufficient to meet daily treasury payments and transfers under most circumstances

Maintaining a “safety” buffer on top of the “transaction” buffer is important for prudential reasons

But otherwise as low as possible to save costs

Emergency credit lines and borrowing can supplement transaction buffer

Provide a safety reserve in the event of auction failure or other adverse market conditions that affect financing

Size depends on nature of risks and expected time to return to normality

# Alternative Approach*

## Buffer for Cash Management

- Volatility of cash flows
- Risk of extended period of outflows
- Forecast errors
- Mitigants include access to central bank, credit lines

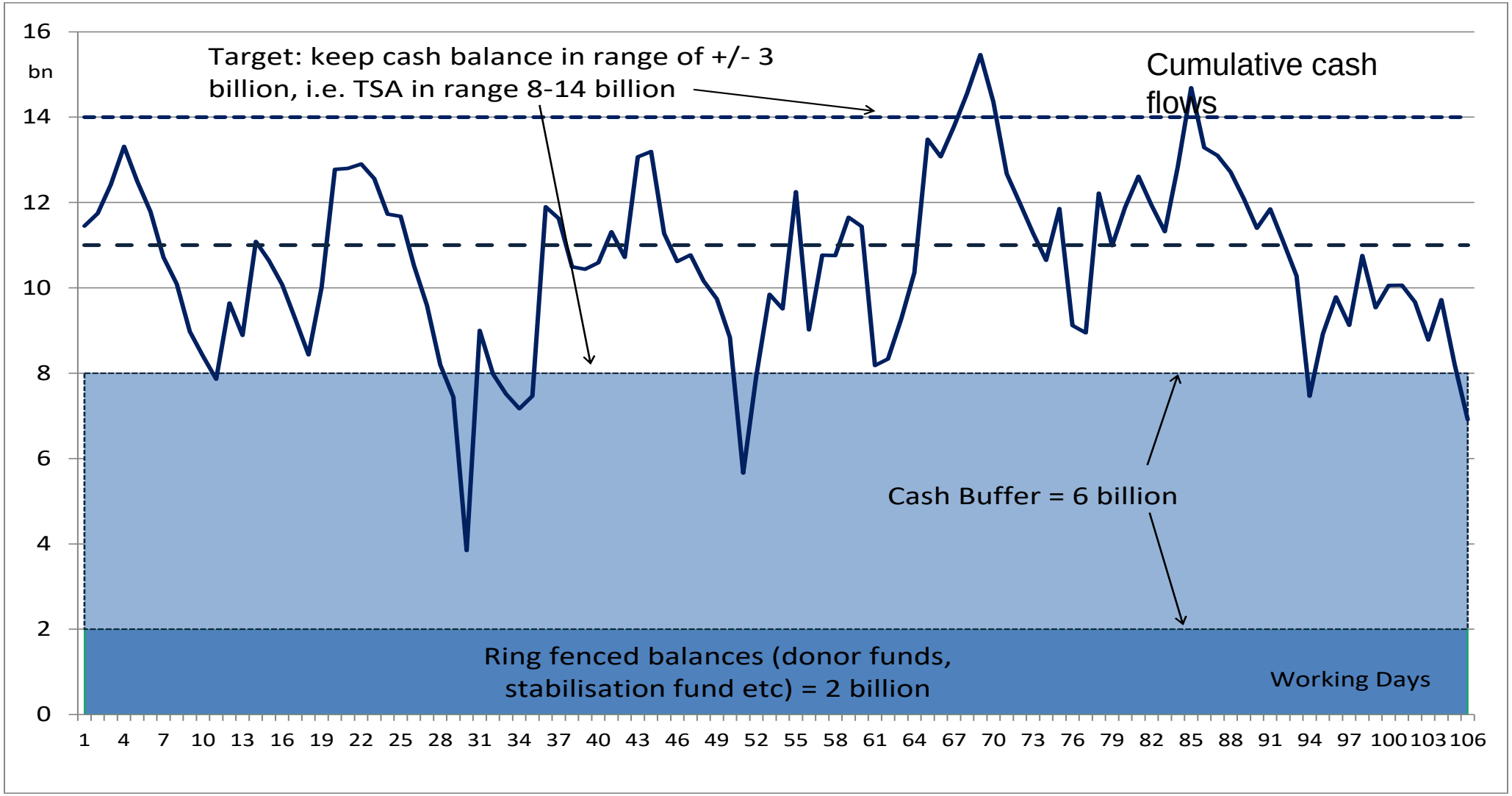
## Buffer for Debt Management

- Focus on debt service for period ahead
- Risk of market disruption to meet issuance targets
- Mitigants include primary dealer underwriting

- Essentially the same split as transactions/safety
  - The analytical building blocks are the same; and safety nets apply to both
  - Debt/cash split may be more intuitive if debt and cash management are institutionally separate – but decision making (at least) should be integrated

* see IMF How-to-note

# Identifying the Transactions Buffer



# Transactions Buffer: the Relevant Variables

1. The volatility of daily cash flows
2. The ability to forecast those cash flows
3. Ability to respond to the forecasts
4. The scope (& timescale) for managing unanticipated fluctuations
5. Safety nets
6. Cost of Carry

# The Usefulness of Historical Volatility

If historical daily volatility is known, able to calculate relationship between size of buffer and chance that cash will always be enough

Example: buffer to give e.g. 99% confidence level that balance will not fall below zero over a month.* But:

- Underlying distributions of flows may not be normal (should test)
- Expect negative serial correlation (errors offset within the month: e.g. tax receipts may be delayed by just a day,
- Is there a way of dealing with the residual 1%? Do we worry about black swans? Should we aim off for fat tails?

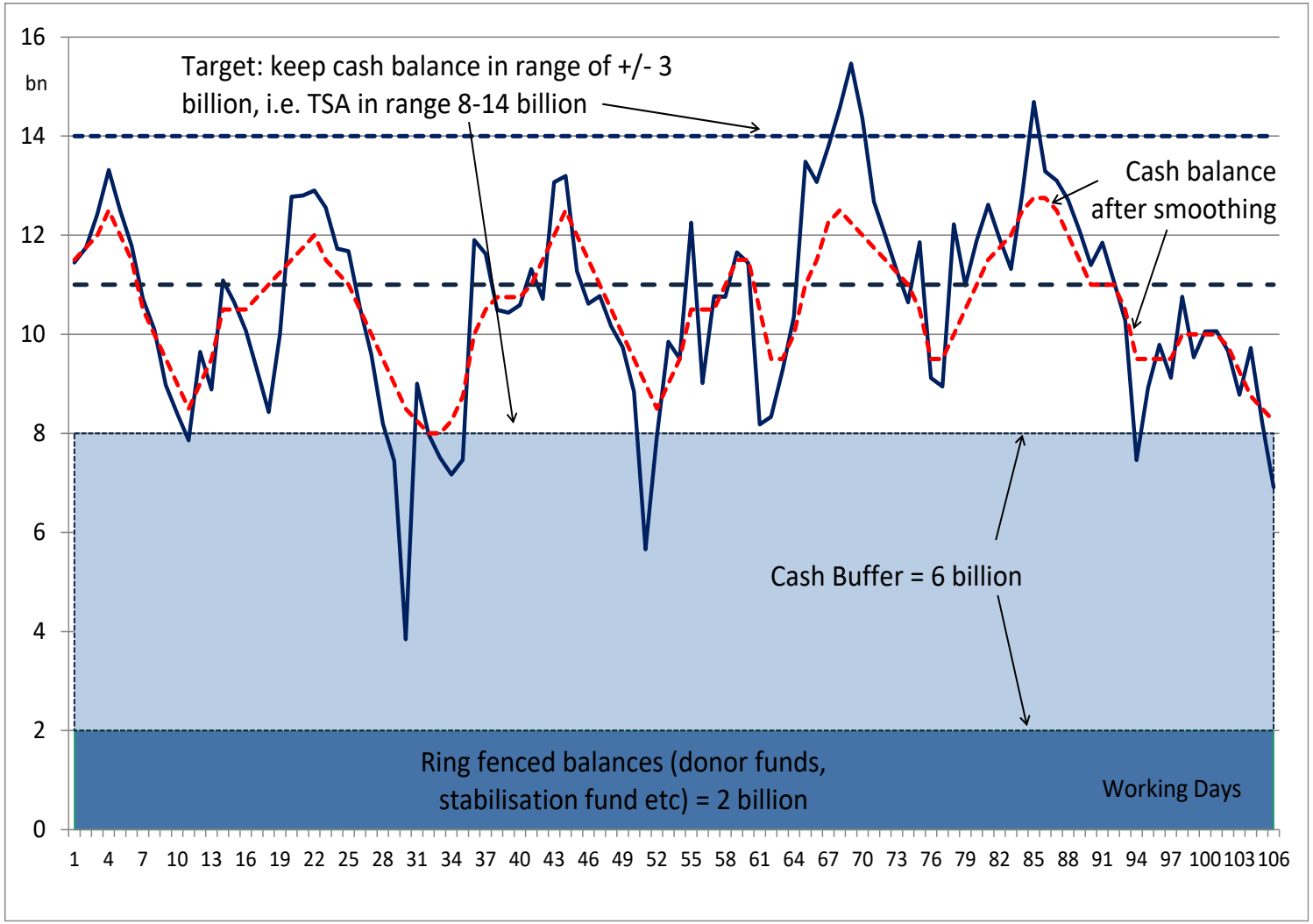
Possible to develop probabilistic models relating the optimal cash balance to the interest rate differentials (on overdraft or funding rate compared to the rate on cash balances). Measures cost of caution. But again assumes:

- Normally distributed errors
- Overdraft borrowing is available and acceptable

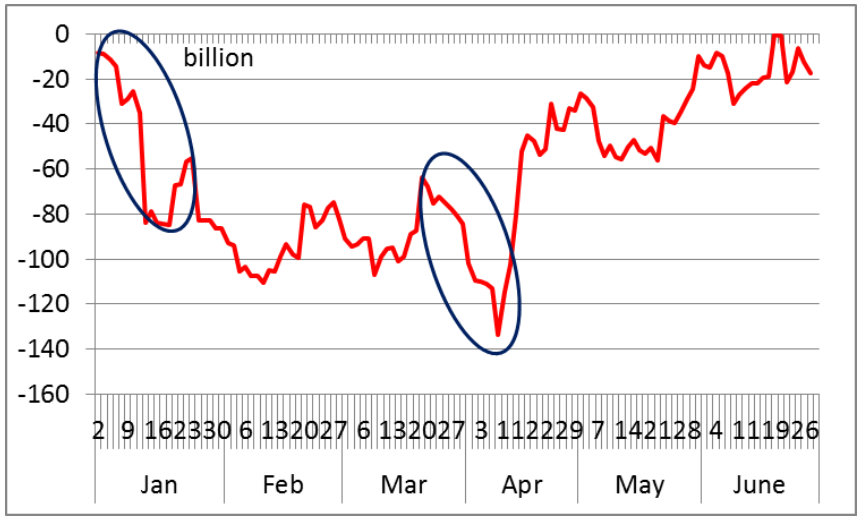
* Multiply daily standard deviation (StDev) by [square root of number of days in month]*[value of normal distribution at a 2% confidence level (1% for each tail)] = StDev*(22^0.5)*2.33 = StDev*11

# The Value of Forecasting

- With a good forecast possible to plan a smoothing strategy
  - Borrowing (Tbills) and investment
- If forecasts are “perfect” and Tbill market sufficiently liquid, theoretically no need for any cash buffer
- The better the forecasts, the less the buffer

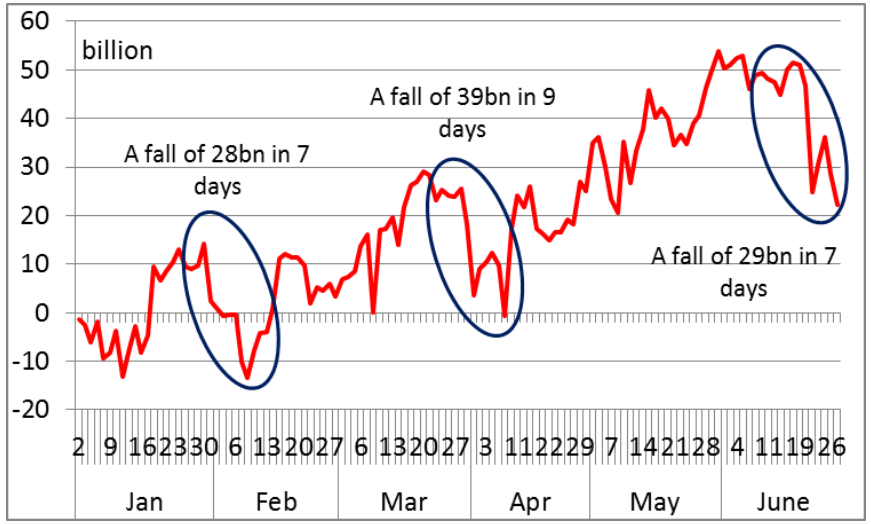


# Example: Importance of Forecasts




Actual cumulative cash flow: fall of 80 billion in a short period

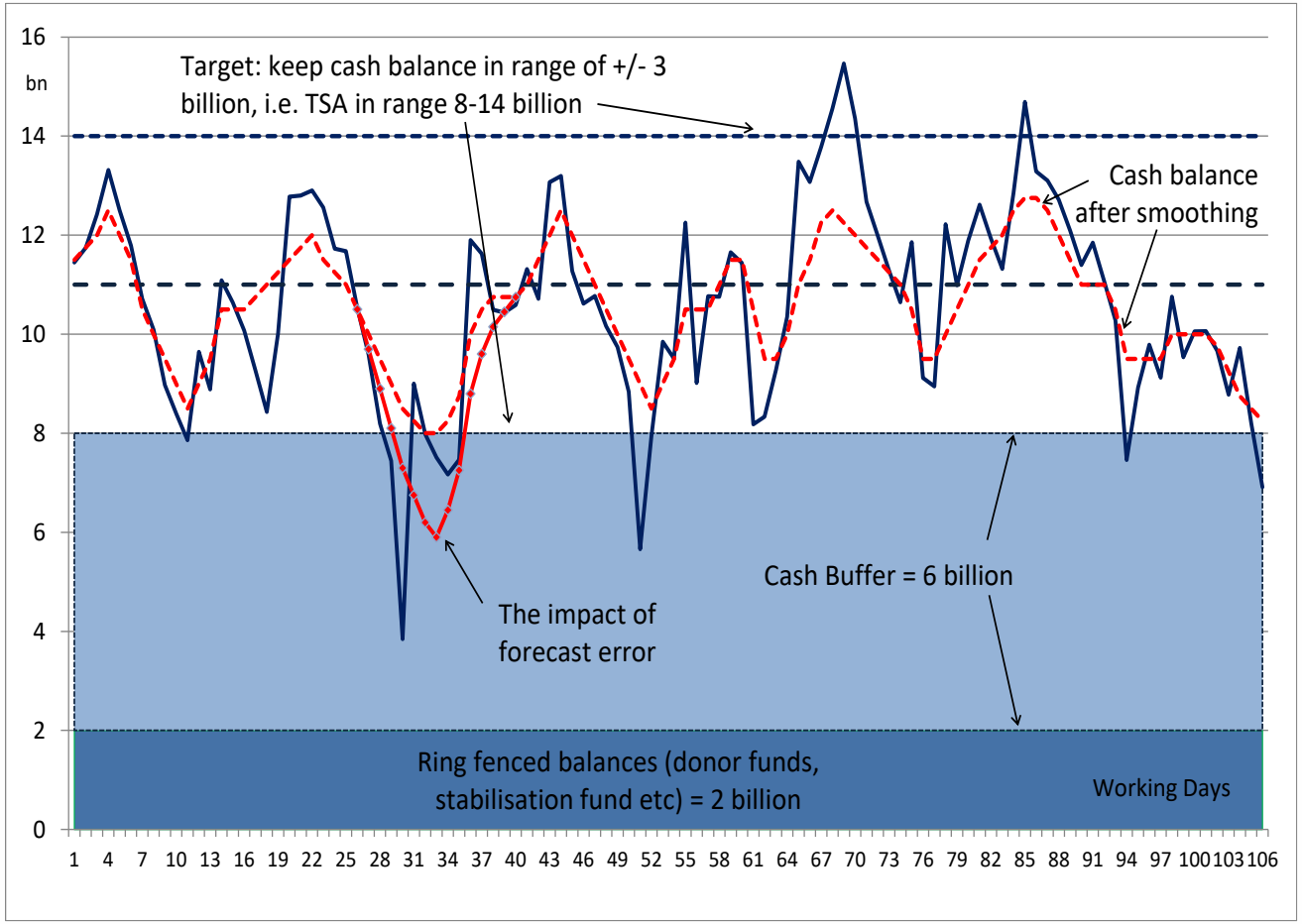
Cash flow forecasts: accumulated error in a short period suggests that 30 billion would be sufficient




Note: if it is not possible to respond to forecasts, then underlying volatility remains relevant – if Tbills issued weekly, likely still to be volatility within the week (unless repo is available)

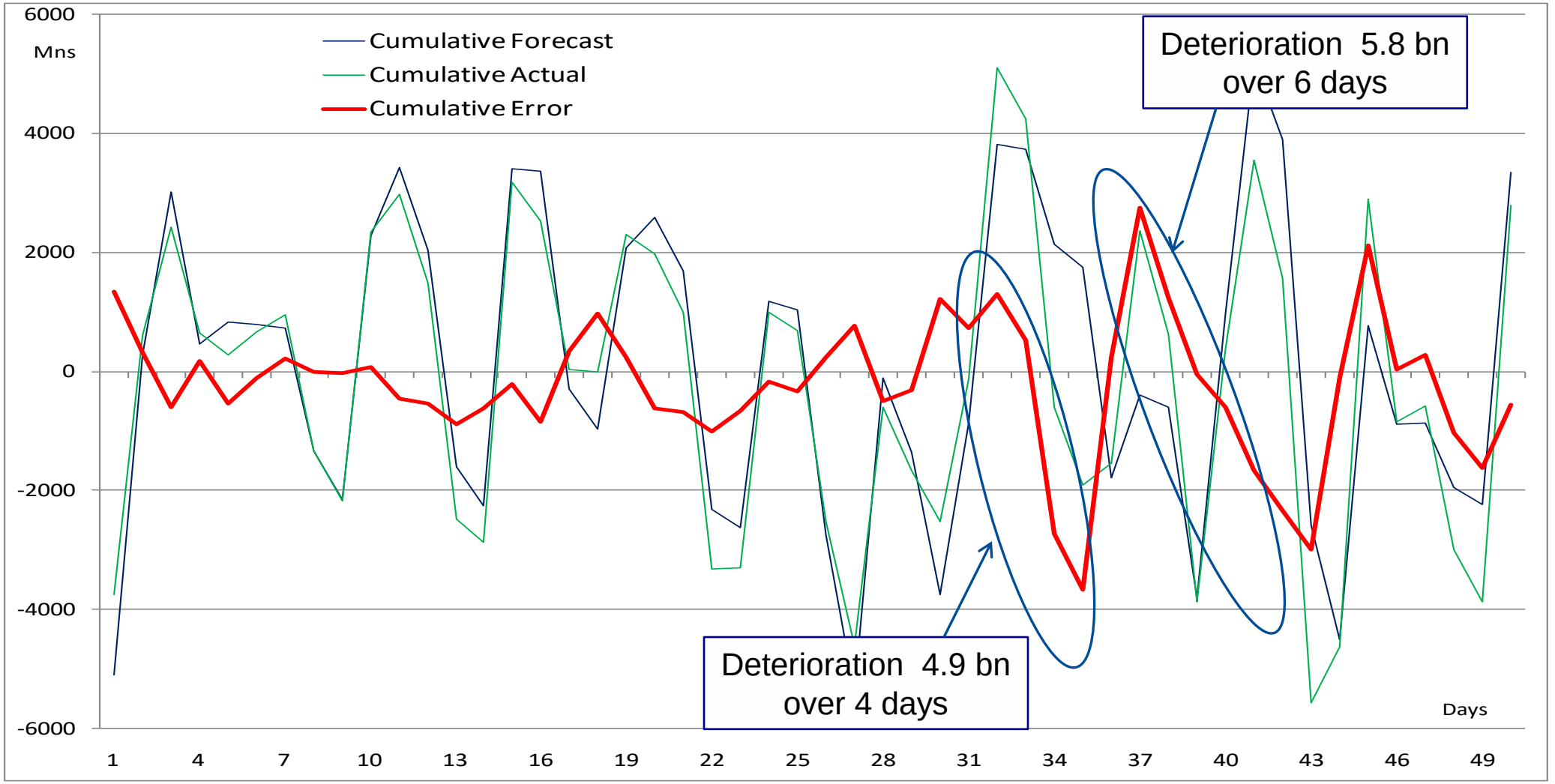
# Impact of Forecast Errors

- Standard deviation of the errors in the forecast << standard deviation of the outturn
  - but they will not be zero
  - It is the cumulative error that is important
- Identify: the maximum unanticipated fall in the cash balance over any period where intervention is no longer practical
  - In this context, the timescale over which unanticipated fluctuations can be managed is important.
  - In countries that issue Tbills regularly that is probably between 1-2 weeks

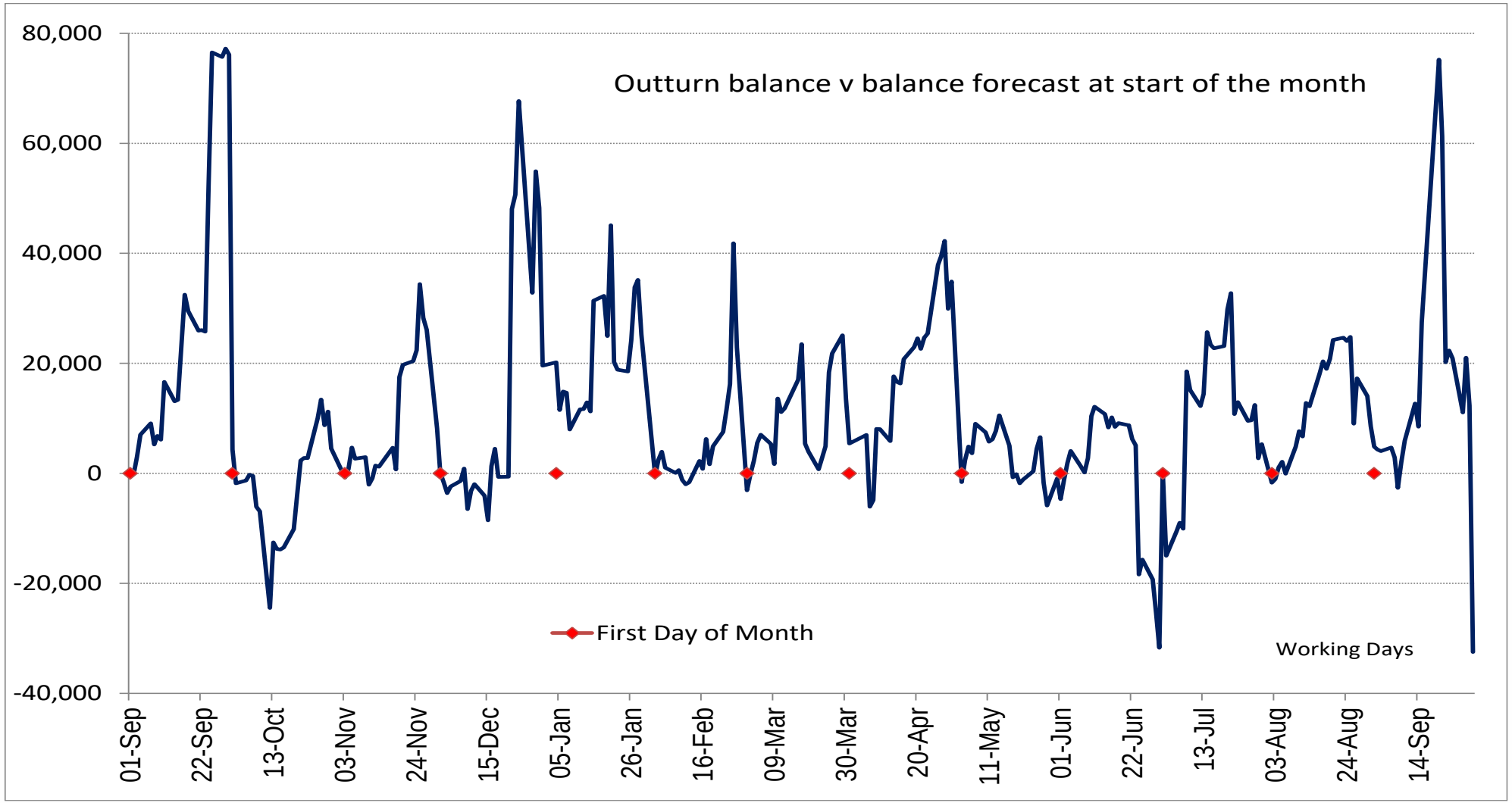



**Transactions buffer = Maximum cumulative forecast error over reaction period**

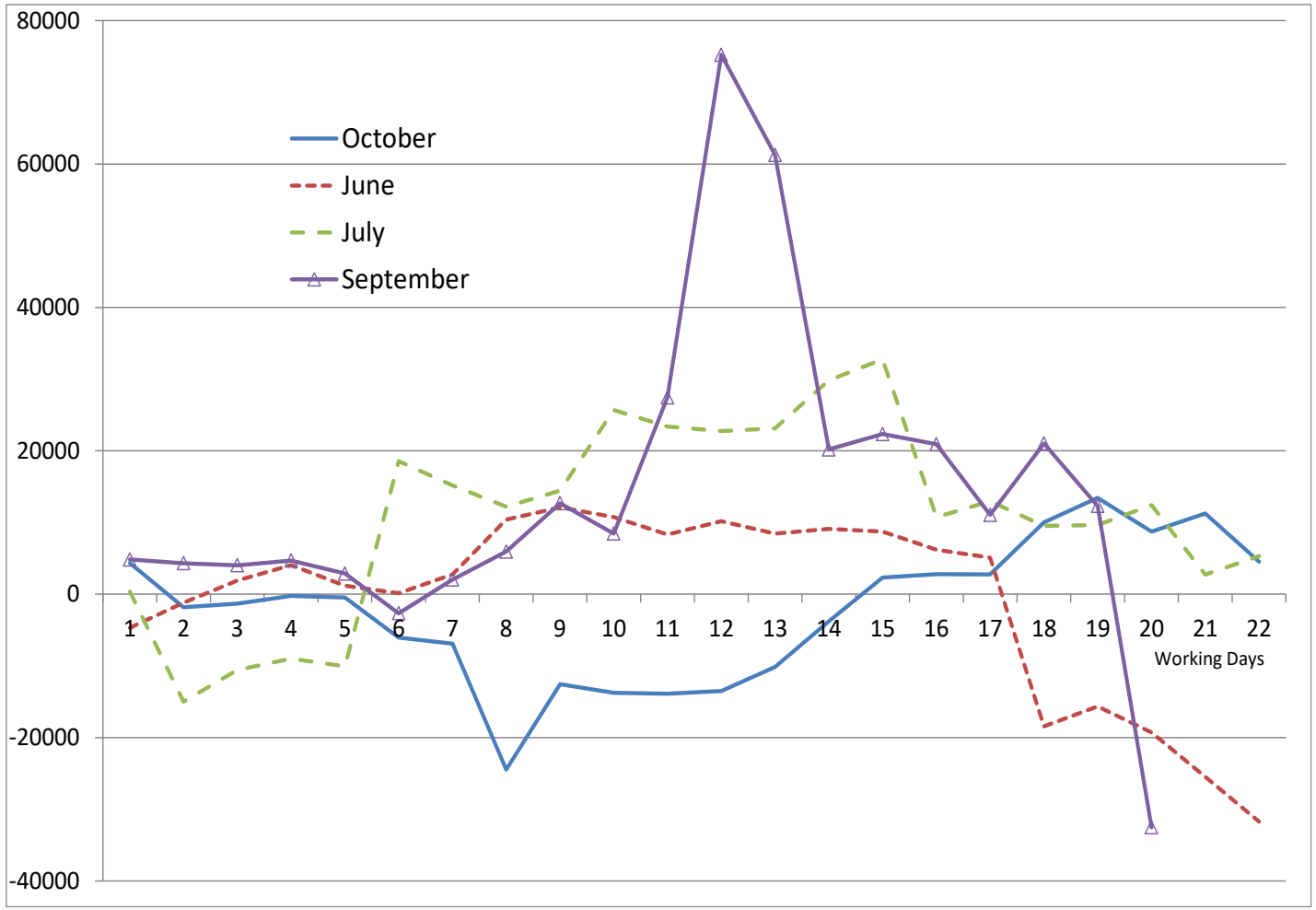
# Transaction Buffer: Illustration



# Other Example…



# Focus on Cumulative Errors




- October: cumulative negative error at start of month – 29,000 over 7 days.
- June: at end of month, cumulative error 37,000 over 5 days. But linked with rescheduled bond sale. To the extent that decision was made earlier, no problem.
- September v. volatile. Positive error mid-month, linked with bond auctions and a tax receipt, reversed itself, then deterioration 30,000 at end month
- Suggests minimum balance c.30-40,000 [plus safety reserve] – needs more analysis

# A Case for Scenario Analysis?

Forecast errors are backward looking – may want to cross-check with scenarios of adverse circumstances

- Can link forecasts to specific assumptions; as necessary the buffer can be "released" when concerns are past

Potentially useful when a significant change in cash flow pattern is expected or there are many one-off components in forecasts

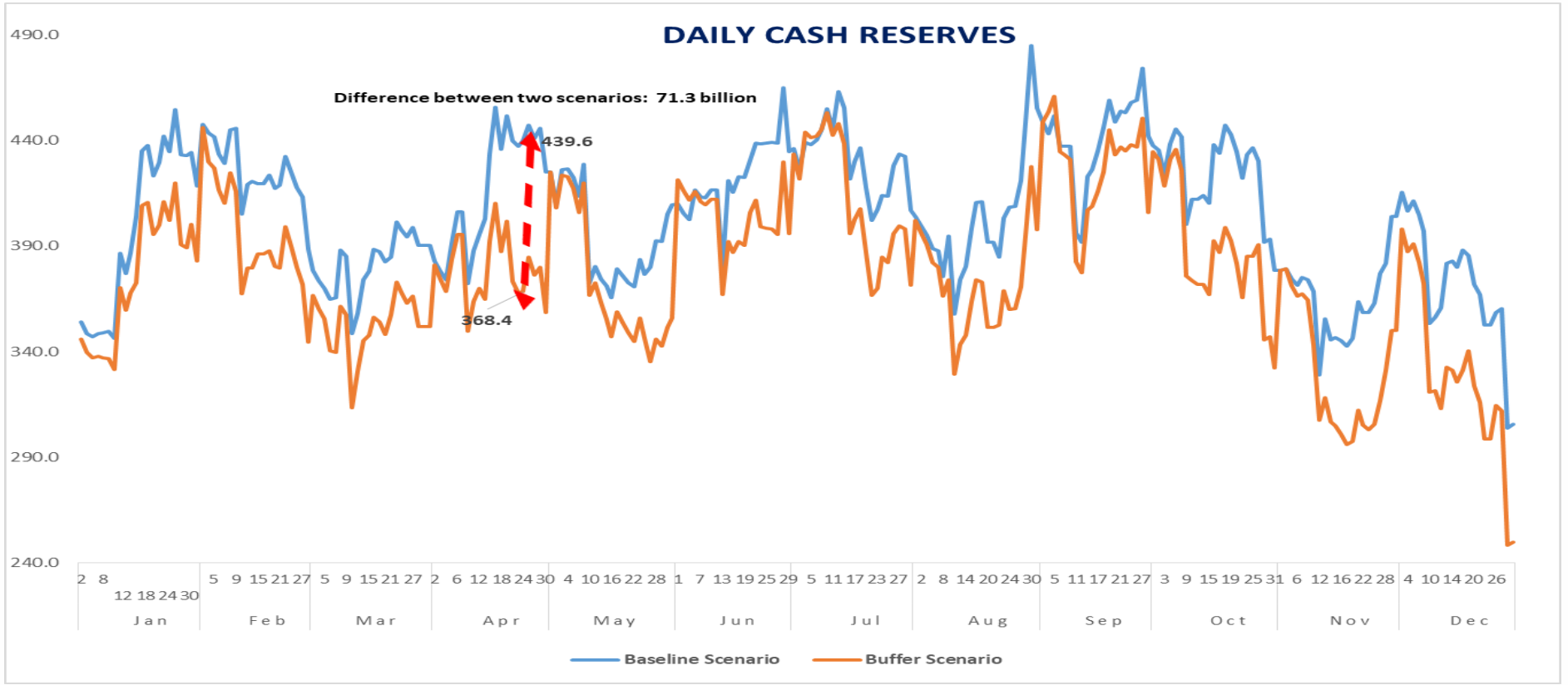
Examples: allow for:

- Increased revenue or expenditure forecasts errors, compared with historical experience
- One-off expenditure or revenue shock
- Denial of market access

Possibility of 2-tier buffer; some part held as near-cash reserve at higher rate? [eg Canada's callable deposits]

# Scenario Analysis: an Example*

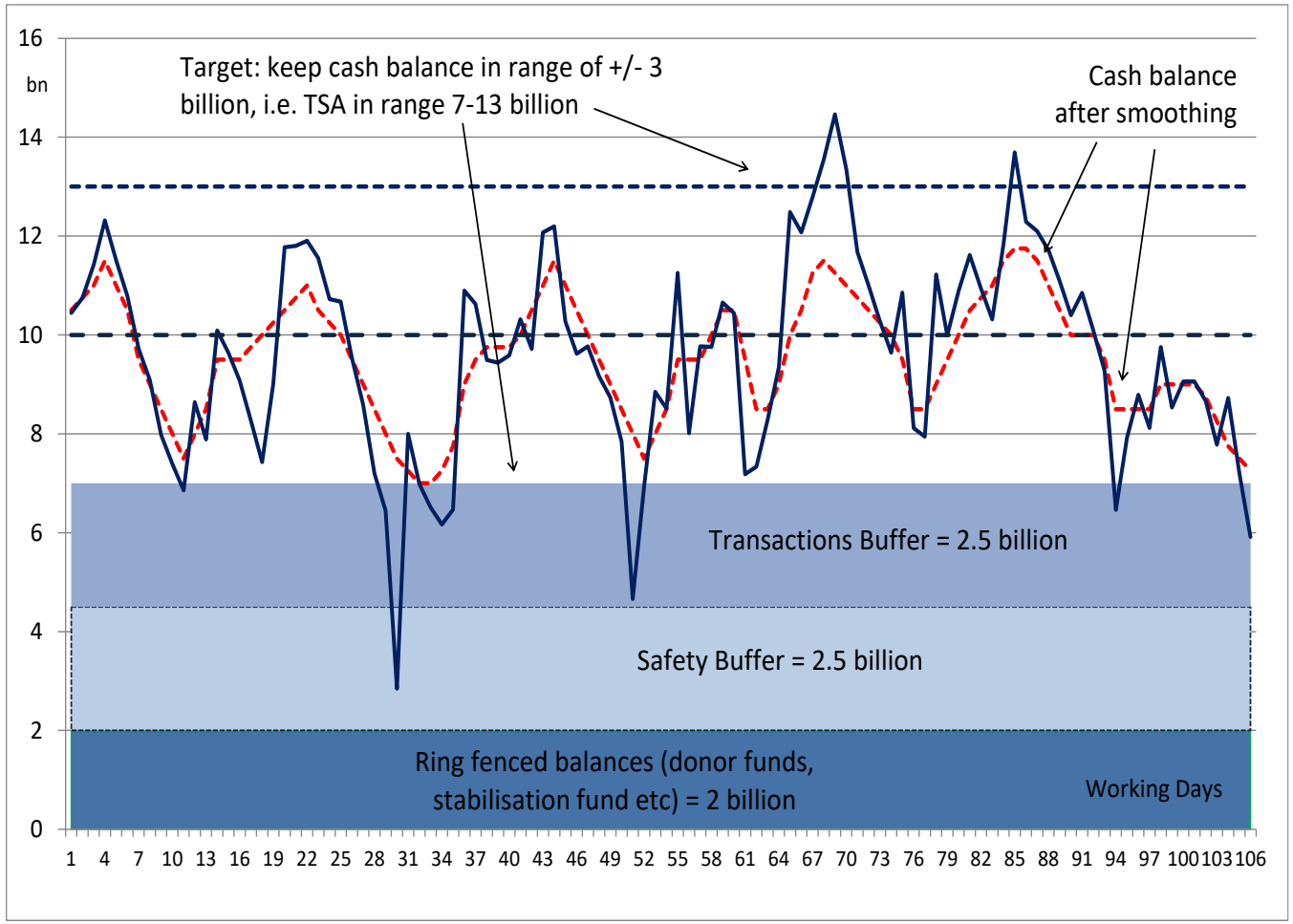
| Source of risk | Assumption |
|---|---|
| **Revenue forecast error** | Average negative deviation in revenues would be 1 % higher than the average monthly absolute deviation in revenues in the previous year |
| **Expenditure forecast error** | Average deviation in expenditures would be identical to the average monthly absolute deviation in expenditures in the previous year |
| **Revenue shock** | - % 25 of the each on-lent credit receipts will not be collected<br>-Privatization revenue receipts will defer by 2 months |
| **Expenditure shock** | 1 day equivalent of total expenditure amount would become due randomly two weeks in advance within each month |



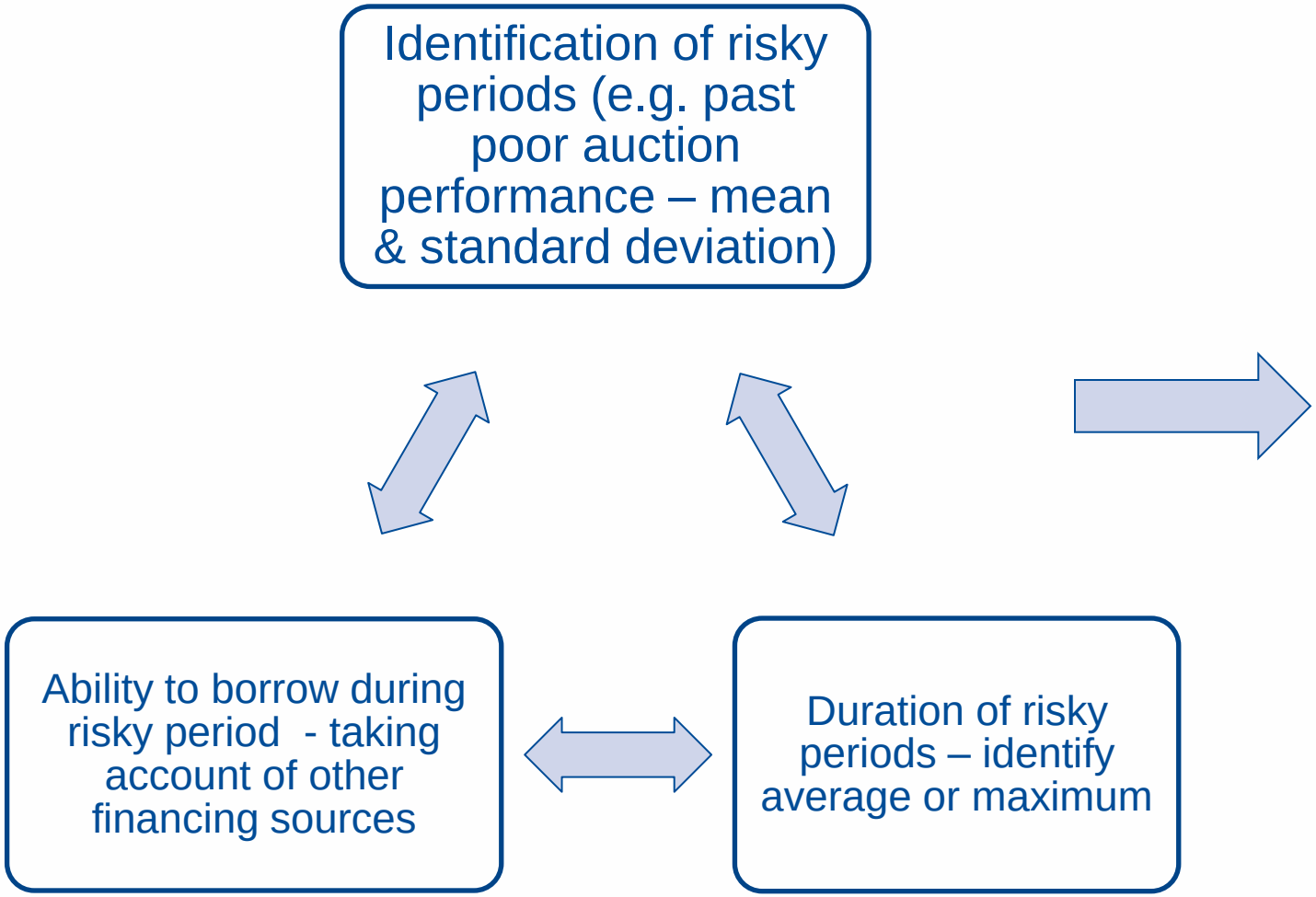

* Based on workshop ppt of Ilyas Tufan, 2022

# Safety Buffer

- **Options**
  - Maximum amount of financing needed if the capital market was disrupted for [2-3] months and no or limited bond issuance could take place in that period
  - Protecting auction program improves credibility of government
  - Some countries allow explicitly for a failed government securities auction
- **Mitigants**
  - Underwriting obligations on Primary dealers
    - Risk that will not in practice work at time of stress
    - Slovak Republic : primary dealers obliged to set up a money market credit line to the government for trades on money markets worth at least €100 million, with a minimum tenor of 14 days



# The Safety Buffer – other Considerations

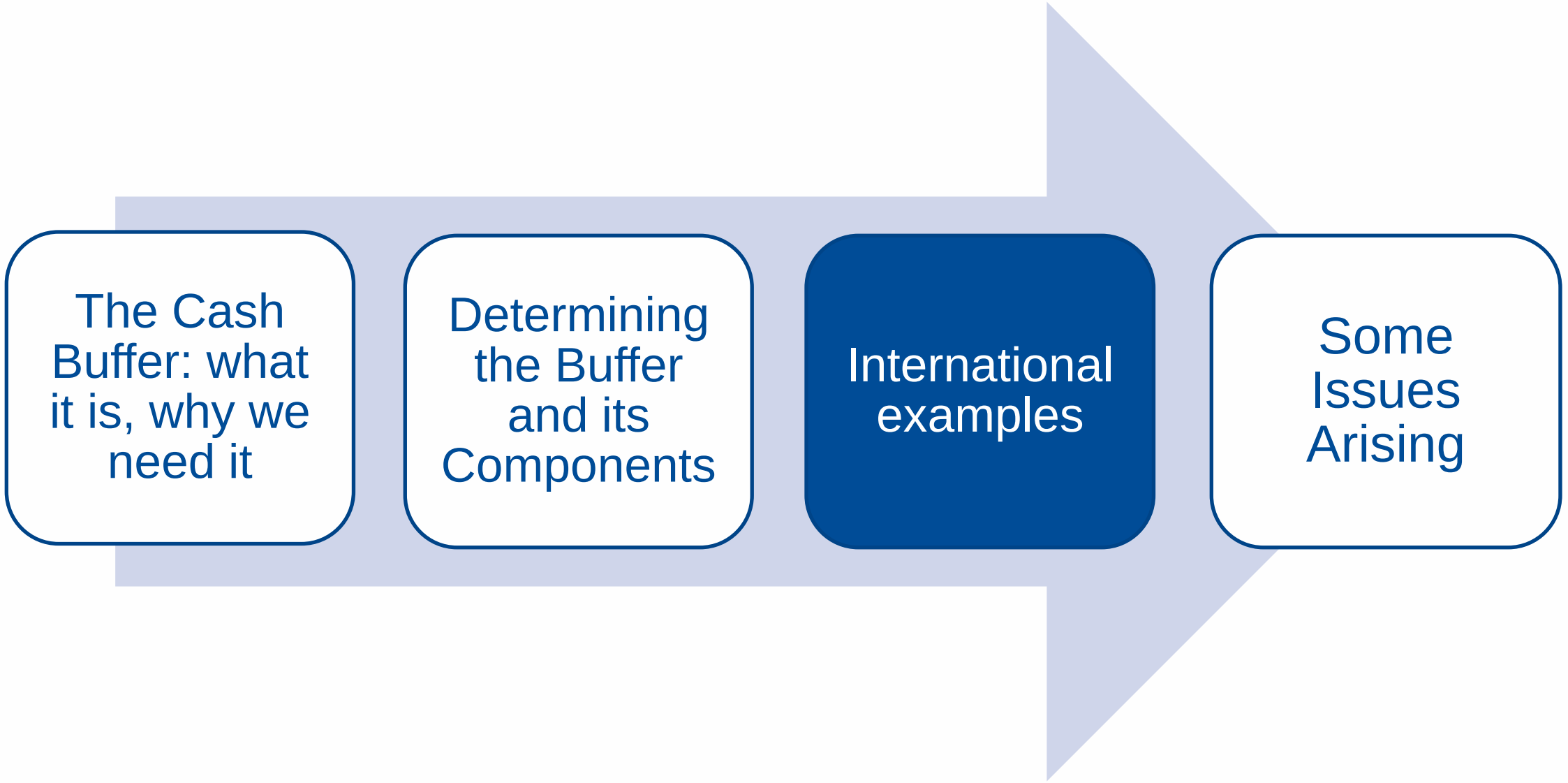



- Might imply need a dynamic buffer – that changes over time depending on perceived risk
- (Türkiye example – see later)
- Also plan for redemptions [strictly not part of buffer since they are known – definitional question]

# Safety Nets?

| | |
|---|---|
| Borrowing from the Central Bank | • Not an option in many countries – quantum and tenor should be constrained |
| Credit lines with commercial banks | • A useful option although it usually carries a cost |
| Breaking deposits | • Often possible (not for repo) – with a penalty |
| Access to FX | • Same day value? |
| Other cash sources? | • Sovereign wealth funds – should be arm's length |

# Outline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# Cash Buffers in Practice - 1

Cruz and Koç Survey of OECD Countries 2016

- 29/35 countries agreed that buffers are important and effective tool to mitigate refinancing and liquidity risk
- Cash is the main asset, mostly in central bank, mostly domestic currency
- Main purposes: to manage time differences; to reduce refinancing risk and to withstand severe liquidity strains, enhancing market confidence
- Most common practice: a buffer sufficient to meet one month of expenditures – but great variation (following debt crisis Greece set cash reserves to cover debt service the next 4 years, exc Tbills)
- Estimated by a range of liquidity indicators and scenario analysis
- > half respondents disclose their cash balance regularly as a part of transparency of public finances
- DMOs primarily coordinate governance of the buffer with the MoF & central bank

Several N.Europe countries operate with cash balances << 0.1% annual central government expenditure

- But they have liquid money markets, sophisticated active cash management
- Some plan to be long of cash and on-lend only when position is secure
- Drying up of liquidity in financial crisis led some to be more cautious

# Cash Buffers in Practice - 2

Some other approaches – the importance of signalling prudence

- Buffer calculated as safety reserve in event of adverse market conditions – market closure or higher costs
- Maintaining balances >= debt redemptions due in next month, implicitly allows for failed auction
- To guarantee budget execution or debt service for [X] months
- In Italy used to be (until 2011) a legal requirement for balances to exceed €10 billion – the peak of cumulative net outflows reached in any period
- Uruguay focuses on risk of excessive cost of borrowing rather than access to borrowing – implies a large buffer
- See also results of World Bank 2014 survey at annex

## Comment

- Simple approaches [x days of flows] risk excess reserves, which carry a cost
- Buffer must have some analytical underpinning – from data and experience
- Some cash rich countries do not have a buffer – but structurally surplus cash can still be put to good use => may be cost effective to borrow with Tbills to smooth cash flows even if there is surplus cash

# PEMPAL Countries: 2021 TSA Survey

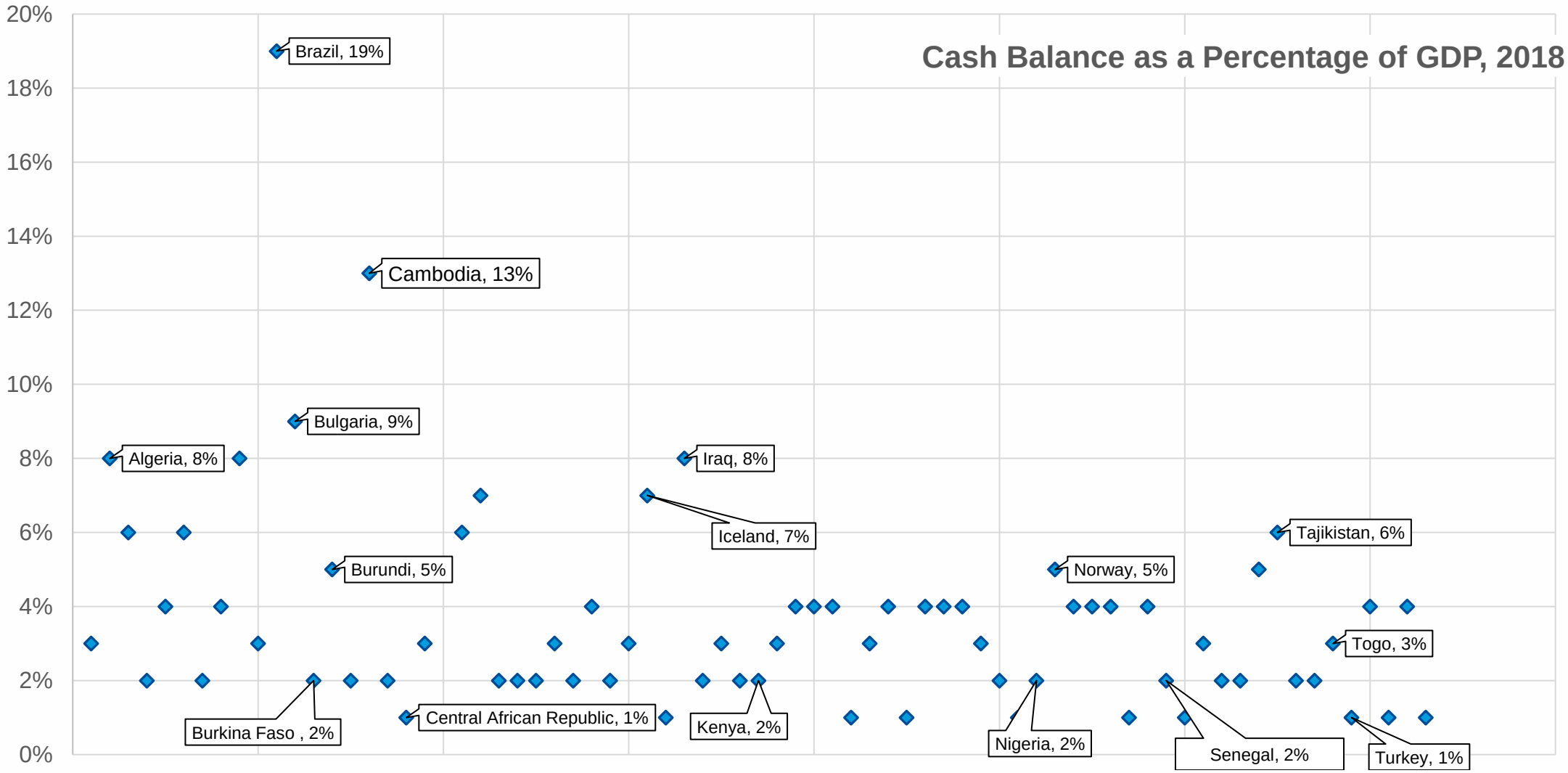
## Only three countries reported a formal target for cash buffer

- Albania: the buffer, minimum and maximum levels, is defined largely in relation to expenditure flows across a month. It can be varied as required.
- Hungary: the buffer was first set in 2003. minimum balance set at 4-6 weeks of gross financing needs Increased following financial crisis to boost investor conference. In 2013 change in outlook implied target modified to 50% of bond and loan redemption in the first quarter. In 2017 switched to percentile of daily cash flows for minimum limit with optimal balance based on 6 weeks of financing plan
- Türkiye: the buffer, also first set in 2003, is defined in relation to cash flows; it may also vary across the year

## It may be that most countries operate a buffer in practice even if it is not formally defined

- 8 of the 12 countries reported a buffer in the 2016 survey
- Most countries pointed to the volatility of revenues and expenditures; and the errors in forecasting them. Other factors included: the risk of auction failure; or of wider financial market disruption; or of contingent liabilities crystallizing
- Safety nets: several mentioned ability to break deposits, and access to FX balances

# Cash Balances: Some Country Examples




Central government cash balances at the central bank / GDP, 2018 data- Source: IMF Monetary and Financial Statistics

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# Hypothecating the Buffer?

Should there be sub-categories within the buffer ("sub-buffers") linked to specific expenditures or risks? For example:

- A debt service sub-buffer linked to exchange rate or interest rate fluctuations
- A contingencies buffer for non-budgeted expenditures

Ideally not:

- Sub-buffers risk an unnecessarily high total buffer, with costs arising
- The underlying calculation of both transactions and safety elements should take account of all risks

Possible exceptions

- If cash is not fungible (there are protected or hypothecated balances in the TSA) that may need to be reflected in sub-buffers
- Access to FX may need to be protected if there is a risk that the central bank is unwilling to supply on demand, or it is not available on the local market

# Investing the Buffer

## Normal presumption is that the buffer is held in the Central Bank

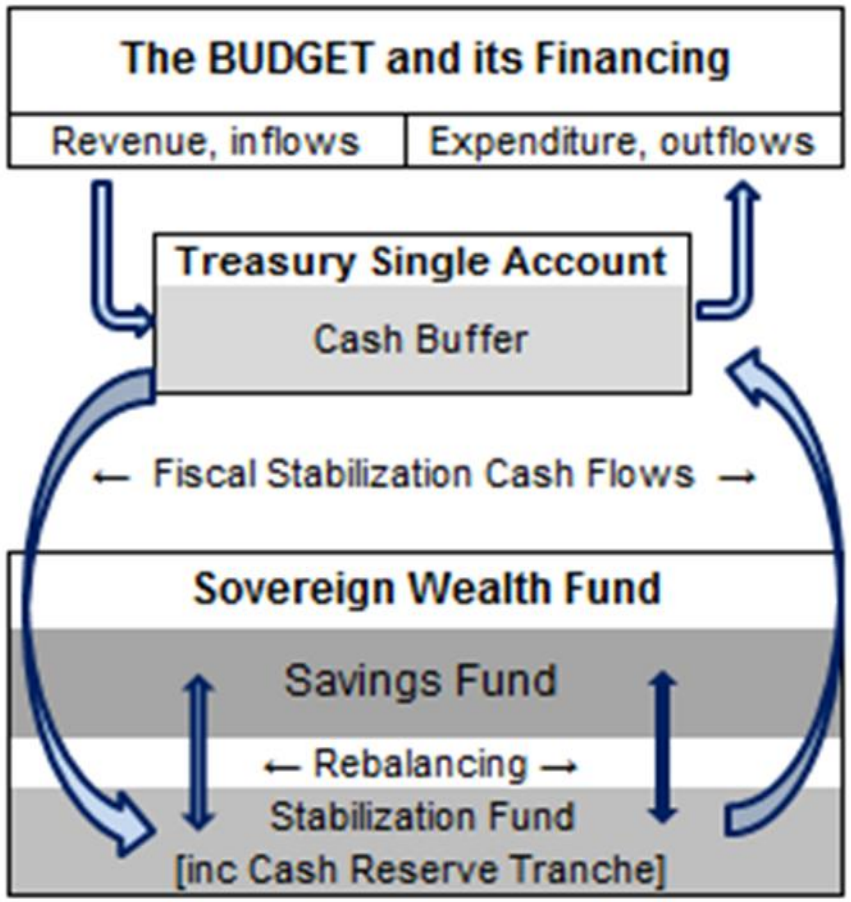
- Part of the balance in the TSA – as seems to be the case from the survey
- Avoids any credit or liquidity risk
- If cash managed actively to keep TSA close to the buffer, no adverse implications for monetary policy
- Should be remunerated at risk-free market rate (close to the policy rate) – reflects opportunity cost and to give the right incentives

## There are other options, at least for some part of the buffer

- Deposits with commercial banks; but beware of
  - Credit risk unless collateralized (or as reverse repo)
  - Liquidity risk unless very short term or callable (breaking term deposits incurs a penalty)
- Money market funds – but claimed liquidity may be a chimera
- Such options may be more relevant for a cash reserve fund above buffer (next slide)

# Cash Reserve Funds

- Intermediate option between the buffer and longer-term funds.
  - Especially if money market is thin or volatile
  - Comprises a reserve source of liquidity if cash management problems; or a cushion against a concerning future scenario (e.g. banking collapse, impact of a pandemic)
  - Examples: UK 3G 3-month cash fund; Peru's market liquidity fund; Canada's callable deposits with central bank
- May be separate from stabilisation or wealth fund; or in a single vehicle – integrates seamlessly with cash management
  - Excess cash flows into fund
  - Stabilisation buffer in the fund defines scope for a long-term savings objective – periodic rebalancing
  - "Cascading framework"



# Changing the Buffer over Time

- Several countries have modified buffer – taking account of market conditions (change in interest rates as well as stressed markets), ability to manage cash balances more actively, and expected fiscal pressures/borrowing requirements
- Many countries increased during covid even if fallen back since

## From year to year

Portugal: initially (2013) 100% of gross borrowing needs (exc Tbills), reduced to 50% in 2015, then 40% in 2017. Buffer was part of policy to improve market confidence – linked with transparent communications strategy

Poland: stronger fiscal position allowed reduction from PLN 85 bn to PLN 26 bn in Dec 17

Hungary: buffer increased following 2008-09 crisis; since fallen back

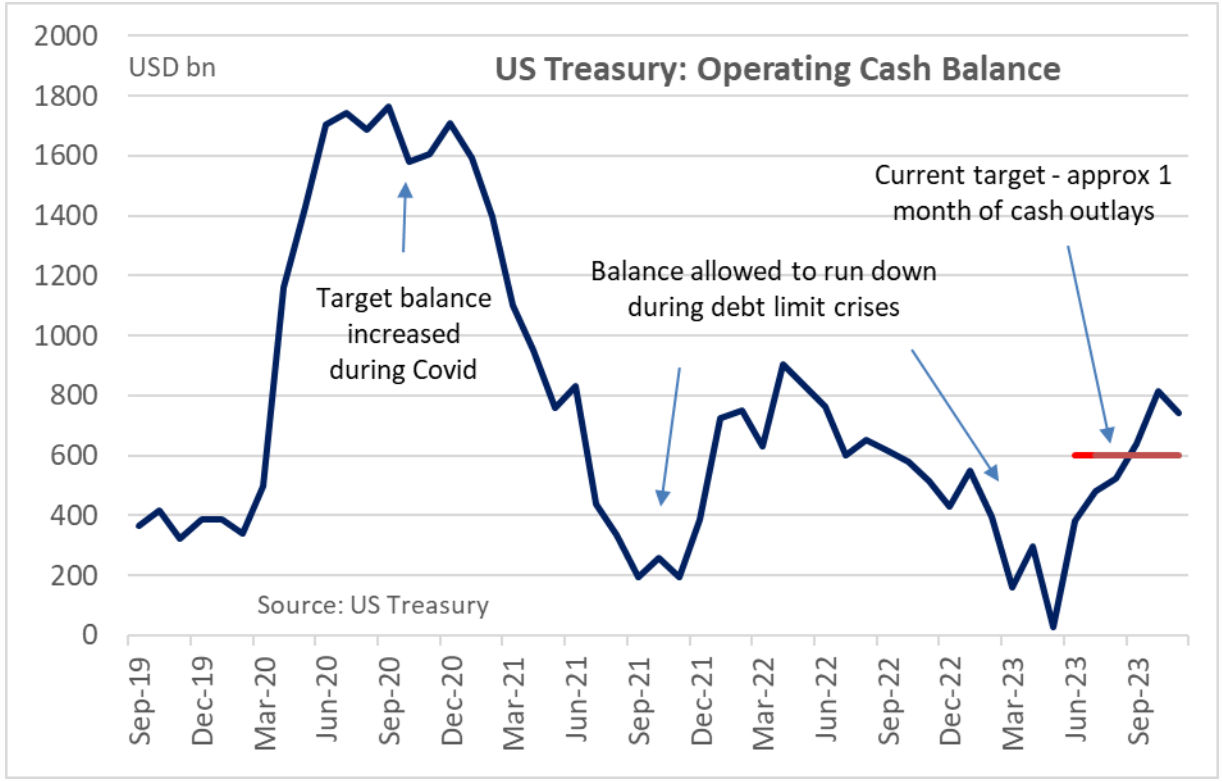
## Within the year

Türkiye: minimum limit reviewed monthly – takes account of volatile redemption profile

UK: informs central bank each week of its target average balance for the week ahead

# Variation over time: the US Example

- Buffer requirements first identified in June 2015
  - Emphasised role of avoiding potential disruption to financing programmes (e.g. auction calendars), in turn supporting predictability in public debt management.
  - Based on assessment of emerging threats, including temporary loss of market access following a cyber-attack, storm or terror attack
  - Original target: cash sufficient to cover one week of outflows in the Treasury General Account
  - Since modified – see chart



# Structure of the Buffer

Minimum floor is most common

Zone around a preferred balance – Australia

- Miller-Ord model can help to guide preferred band width – see annex

In Eurozone, ECB does not renumerate above a target level – to encourage countries to manage to the previously agreed level

Two tiers

- Some countries distinguish between cash buffer and liquidity buffer
- Hungary example
  - Minimum TSA balance is calculated using the extreme daily Treasury expenditures
  - Optimal TSA balance (to be targeted by the financing plan), based on the forecast error and financing risk in the annual financing plan (e.g. risk of higher deficit, risk of unsuccessful auctions, cash outflow in the retail debt program). Take account also of risk of market stress

# Governance

| | |
|---|---|
| Who decides [or leads in recommending to decision makers] | • Integrated DMO – issue does not arise<br>  • Example Hungary: ÁKK proposes the level of the minimum liquidity buffer; approved each year by Minister of Finance<br>• In separate debt/cash functions:<br>  • Cash managers better placed to do the transactions analysis<br>  • But debt managers need to consider debt management/safety buffer<br>  • Implies a need to liaise – to ensure an integrated approach, and shared understanding of safety nets available |
| Essential to inform central bank | • It must know what is being targeted as an input into its liquidity forecast required for open market operations |
| Advantages to informing the public | • Public disclosure has a positive signalling effect on market participants, enhancing credibility of government.<br>• Disclosing actual level of the cash buffer further increases the fiscal transparency and market confidence. Examples: Canada, Denmark, Italy and the US.<br>• In more uncertain environment, some disclose the information about the policy (rationale and determinants) without providing information on the actual and target level of the buffer in order to avoid potential misperceptions |
| Review legislative requirements | • Some countries currently would not allow over borrowing to build buffer |

# Some (General) Conclusions

Cash buffers just one part of the “financing continuity plan”

Need to consider:

- Underlying volatility
- Ability to forecast and take advantage of the forecast
- Ability to react
- Safety nets
- Cost of carry

Distinguish between a transactions buffer; and a safety or precautionary buffer

Avoid formulaic approaches: identify the drivers and consider the opportunity cost

Are there signalling advantages from telling the market?

# References


- Yasemin Hürcan, Fatoş Koç, and Emre Balıbek “How to Set Up a Cash Buffer: a Practical Guide to Developing and Implementing a Cash Buffer Policy” (IMF How to Note 2020) https://www.imf.org/en/Publications/Fiscal-Affairs-Department-How-To-Notes/Issues/2020/12/21/How-to-Set-Up-A-Cash-Buffer-A-Practical-Guide-to-Developing-and-Implementing-a-Cash-Buffer-49955
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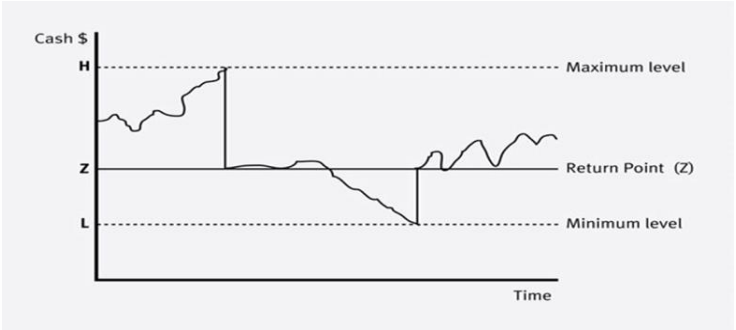
- Mike Williams “Targeting the Cash Balance” (Presentation at PEMPAL TCOP 2016), https://www.pempal.org/sites/pempal/files/event/attachments/pempal-mike_williams_targeting_the_cash_balance_mar16.pptx.

# Annex: Some Other Techniques

## Miller-Ord Model

- Controls irregular movements of cash by the setting of upper and lower control limits on cash balance
  - Difference between them depends on cash flow variance, interest rate and transactions costs
  - At upper limit, buy securities; at lower limit sell securities – aim for a target between upper and lower limit.
  - But it does not specify how to determine lower limit ("set by management")
  - Not used in practice by governments




## Liquidity Cover Ratio (LCR)

- Arises from from Basel process
- Considers the high-quality liquid assets available to cover net outflows over a specified period
- But
  - Although potentially a useful indicator for management, it hides complexity and may be difficult to interpret
  - It is a passive concept – in practice governments have options to respond to outflows
  - Decision-makers need more information about the risks and sensitivities, and the cash flow impact of different shocks to which the government may be exposed, so that they can judge the action to be taken
  - Little used in practice (although Colombia has explored it)

# Annex: World Bank Survey*

## Benefits of a buffer generally recognised (11 responses)

- But motives vary
  - Different emphasis as between transactions/volatility and financial stress
  - Some countries (Hungary, Uruguay) quoted need to support debt management operations – e.g. buy-backs – or to reduce refinancing risk
  - Different views about telling the market

## The target

- Often expressed as months of financing – regular flows or specific lumpy flows (redemptions, auctions)

## Some countries have no formal buffer

- May be because too much/easy access to cash (Chile, Colombia) or not enough cash (Kenya, Nigeria)

## All countries have some safety nets (borrowing from central bank and/or overnight from commercial banks)

## Uruguay – a different approach

- Deficit + amortization for 12 months (=4% of GDP)
- Based on probability that market is “closed”
  - “closed” = EMBI+ 20%>trend; or Uruguay paying 200bps>EMBI+
  - Focus on external borrowing only – not clear why

** WB Capital Markets Group: Peer Group Dialogue – May 2014*