THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Cash Flow Forecasting: an International Perspective

Workshop, Lisbon

November 2018

Mike Williams
mike.williams@mj-w.net

Outline

Annexes added on Examples of Pattern Analysis; Forecasting in selected countries; a Revenue template; and tasks of the CMU

To recall…. the Objectives of Cash Management

Ensuring cash is available to facilitate the smooth execution of the budget

Overriding objective – other objectives must be subject to it

But other objectives are important

- Economising on cash within government
  - Saving costs
  - Reducing risk
- Managing efficiently the government's aggregate short-term cash flow
  - Both cash deficits and cash surpluses
- In such as way as also to benefit
  - Debt management
  - Monetary policy
  - Financial markets (market liquidity and infrastructure)

What Cash Management is Not!

Cash management is distinct from budget management or budget execution

- Budget execution is about ensuring that the budget is managed consistently within agreed financial limits
- Cash management is about ensuring that the government has the liquidity to execute its payments - requires planning ahead

Cutting planned expenditure because of a lack of cash is <u>cash rationing, not cash management</u>

- Effective cash management removes the need for cash rationing

The Policy Challenges are linked…

Cash Flow Forecasting

- Efficient cash management requires ability to forecast daily cash flows across the TSA
  1. To facilitate orderly achievement of budget targets; to ensure that budgeted expenditure is smoothly financed avoiding delays; and to give early warning of any problems
  2. To devise the strategies for active cash management

A smoother cash flow means:

- Lower average cash balances
- Reduced net borrowing costs
  - Interest on cash balances always less than interest on marginal borrowing
  - Interest can be earned on any temporary cash surpluses [not in current Eurozone environment]
- Less pressure on central banks' monetary policy operations

- Characteristic of all modern government cash management systems

Some Distinctions

Annual Budget

- Forecasting the annual and multi-annual fiscal position (deficit/surplus, financing)

Budget profile

- Agreeing monthly profiles for budget execution & monitoring

In-year Forecasts

- Forecasting [daily] net flows to help debt and cash managers

Suggested definition: "Cash flow forecasting is the process to estimate future government cash inflows and outflows, with a view to taking action necessary to ensure that sufficient funds are always available to meet any net government cash requirements; and, in any period where there is a net cash surplus, to ensure that it is used to best advantage."

The budget profile is important to calibrate the budget, prepare the financing plan and monitor performance. It can control appropriations. It should be updated regularly and sets the framework for in-year forecasts; but they have a different purpose

Financial Programming and Cash Flow Forecasting

Financial/Cash Programming

- Linked to budget execution
  - Forecasts based on budget profiles
  - Profiles often linked to appropriations
  - Revenue forecasts may also be constrained to budget target
- Two objectives:
  - Controlling spending profile to ensure cash availability
  - Identifying short-term cash requirements and surpluses
- Risk confusing targets/ controls with forecasts

Cash Flow Forecasting

- Forecasts independent of control totals
  - what "will" happen" not what "should" happen
- Two objectives
  - Ensuring that cash is available when required, with no risk of cash rationing
  - Minimising use of cash over the period ahead
- Often managed separately from budget execution processes

❖ **Both are needed**

Building the Cash Plan

Agreed annual budget, turned into [monthly] profiles:

- Based on returns from line ministries and revenue agencies, constrained to budget totals
- Data on debt servicing, guarantees redeemed etc from Treasury/MoF
- Treasury may also want to check against its own profiles (see below)
- In some countries profile represents ceiling (can potentially be increased on request from Ministry

Net cash position (bottom line) will:

- Provide check on the realism of the budget
- Identify financing need [to the extent that options available]

Authority to spend released in line with profiles

- Cumulative during the year (subject to revised budget)
- Cash released consistently with profiles but only advanced when needed, reduced if any under execution
- Commitments as well as cash need to be monitored
- Early warning of major payments
  - France: AFT must be informed of payments > €1 mn by 16.30 previous day

Timely information on in-year outturns and other developments

Every month or quarter, line ministries and revenue agencies resubmit profiles

Outline

The Role of Cash Forecasting and Cash Planning
Building the Forecast: Tools and Techniques
Data and Resources
Using the Forecast

Developing Cash Flow Forecasts

Must focus on what will happen, not what should happen

- Start from budget profiles but systematically revise, collecting latest information
- Usually built independently of budget process
  - Debt Office (or wider Treasury function), not Budget Department
- Avoid game playing by MDAs

Objective is to anticipate <u>cash</u> needs

- Cash in and out of TSA
  - May be different from recording of revenue and expenditure
- Focus is domestic currency (DX)
  - Unless FX/DX interface is seamless
  - May need to identify FX, donor flows separately (depends on TSA structure)

Cash Flow Forecasting: the Horizon

- Forecast information is needed for some period ahead
  - Timing of future peaks and troughs must be identified to make decisions about financing or seeking other sources of cash;
  - If cash rationing or withholding of allocations is necessary, it gives time to develop response
    - Giving time for MDAs to adjust avoids more damaging unplanned cash delays

- Ideally
  - Monthly profile for the year, regularly updated, supports budget execution
  - But more detailed <u>forecasts</u> looking <u>at least 3 months ahead</u>
    - Monthly, then weekly, then daily
  - Rolled forward regularly (monthly, then weekly)
  - Including over year-end

Building the Forecast

- Identify seasonality, explore patterns
  - Monthly salary payments; regular social welfare or pension payments
  - Some other expenditures – eg agricultural support – may be seasonal
  - Tax payment days
  - Drawing on previous years' experience (see below)
- How to handle end-year surge?
- Identify major individual flows
  - Some are very precise
    - Tax payments by the largest companies
    - Debt servicing (also some donor receipts and grants)
    - Transfers to lower levels of government
  - Payments on major public projects
    - Build contacts with large Project Offices
- Assumptions re EBFs & SNGs?
- Line Ministries and Revenue Authorities must cooperate

Line Ministries, Revenue Agencies and the Forecasts

- Cooperation of LMs and RAs is essential – especially if dispersed accountability
  - Insist on forecasts or intelligence about latest information
  - If necessary, legislate
  - Focus only on RAs & larger LMs (80/20 rule)
  - [and also PMOs for investment expenditure]
  - LMs cover non-tax revenues
- Scope for Carrots and Sticks?
  - Cash penalties/incentives (examples in Turkey, UK)
  - Virement flexibility
  - League tables
- Simple templates, rolled forward regularly
- Personal contacts
  - Avoid requests / information going up hierarchy, across and down
  - Cash forecasters in Treasury must have direct contact with opposite numbers in major LMs and RAs
  - New intelligence (early notice of divergences from forecasts or unanticipated flows) as important as regular updates

Cash Forecasting: Information Network

Identifying Maximum Cumulative Outflow within the Month

The example of a country where there is a sharp outflow during the month before any inflow (real country data)

Monthly forecasts hide the within-month profile

Meeting the cash requirement for the month may still leave a cash shortage in some weeks

Hence the need for weekly and daily forecasts – or identify maximum outflow during month

The example of Italy (from Public Debt Report 2014)

Some Other Techniques

Scope to link days of outflows to days of inflows?

- Payment due dates for new taxes linked to e.g. salary payment dates
- Smoothing salary payments across the month
- Avoid bond redemptions on days/weeks of weak cash flow
- Identify preferred date for privatisation receipts; fix dates of e.g. transfers to local governments
- Inflows before outflows within the month

❿ Requires close interaction with other functions

Particular problems with external flows (inc. EU grants?)

- Highly uncertain, difficult to forecast, may depend on project progress
- Possibly assume project spending and project funding net to zero (but lumpy flows? Or direct payments)
- Inflows may also go to separate accounts (donor or FX accounts) not TSA

The Role of Econometrics

- Econometric models are important for multi-annual projections & annual budget
  - Early warning indicators of macro-economic activity can be useful in-year
  - Some expenditures may be linked to macro or other variables (weather & agricultural support)
- Difficult to develop models that will generate a monthly or quarterly path

Some other Approaches

1. Model underlying trend on which is imposed estimated seasonal adjustments; but not always been an improvement on more simple pattern analysis.
2. Some (e.g. Peru) have explored autoregressive models, relating revenue in one month to revenue in same months in previous years, plus a macro variable and trend factor (and/or tax changes)
3. There are always special factors (policy changes, behavioural shifts) to take into account, and changes from year to year in the day on which month ends or key holidays fall.

=> Experience, intelligence networks and pattern analysis usually more productive

- Average past patterns: use for homogenous flows or when there is no better information
- Separate profiles for different streams; be wary of using for capital expenditure
- Identify past outliers, one-offs or deviations from average
- Take account of end of months on a weekend, dates of public holidays, etc – see Annex 1

Outline

The Role of Cash Forecasting and Cash Planning
Building the Forecast: Tools and Techniques
Data and Resources
Using the Forecast

Institutional Responsibilities

- Forecasting unit often only 2-3 staff (plus resources in MDAs, Revenue Authority etc)
  - Highly active cash management may need more resources
- Forecasters must advise senior management on risks
  - And have an input into decisions on future financing options (next section)
- Institutional location will vary – and may be split
  - Must identify responsibility for aggregating forecasts and identifying policy options

Analysing Forecast Performance and Errors

- Essential part of the forecasting task
  - Planning responses to forecast deviations
  - Learning lessons for the future
- Explore:
  - What does the error in any one period say about the future – will the divergence be sustained or correct itself. Need advice from LMs & RA
  - Timing changes: do errors in one week tend to be reversed in the next; is there evidence of serial correlation in the past
  - Do errors in different series offset each other. May be affected by cash rationing. (Explore standard deviations*)
- It is the cumulative error that matters – and feeds into the calculation of the cash buffer

* Standard error of sum of <u>independent</u> variables is square root of sum of the standard deviations, squared, of each variable. Example: Is StDev [Revenue-Expenditure] >/< $\sqrt{[(\text{StDevRev})^2+(\text{StDevExp})^2]}$

Forecast Performance

- Cumulative error is important
- Forecast appears too pessimistic
  - Over-performance does not tell us much about risks
  - Forecast should be an unbiased estimate – allowance for caution should be explicit

- Advantages of graphical presentation; has implications for the way in which data are maintained

Managing Forecast Data

Large volumes of data

- Forecasts, profiles, returns from MDAs/RA, analyses (do not overwrite successive forecasts)

Forecasters have to:

- Aggregate returns, incorporate other info, prepare scenarios, policy options

Usually use Excel at least initially

- Flexible, under cash managers control, data do not have to be of accounting quality, speed is of essence
- But easy to amend accidentally: requires care and back-up

Link to GIFMIS for outturn info

- Possibly also to collect forecasts, some use e.g. SharePoint

Commitment Controls and Forecasting

The key objectives of commitment controls

- To manage the initial incurrence of obligations, instead of subsequent cash payments – to enforce expenditure ceilings and avoid expenditure arrears

Effective commitment controls must be linked with cash plans

- Some commitments have multi-period cash implications
- Cash plans ensure that commitment ceilings are consistent with projected cash availability (and vice versa)
- Cash planning on its own will be ineffective unless it is integrated with control over commitments

Forecasts make use of commitment information - gives indication of future cash requirements

- Ideally identifies a formal due date for payment; or at least an indicative date
- Capturing commitment of top 5-10% payments by value will cover 90% of expenditure
- But variable lags => commitment information not itself sufficient for cash flow forecasting

Continuing Challenges in Many Countries

- Lack of systematic collection of outturn data
- Different budget and accounting classifications
- Fragmentation of IF systems – hampering data aggregation
- Excel becomes unwieldly and lacks robustness
- Past cash rationing implies distorted historical spending data
- Tax forecasts tend to be more difficult than spending
  - Not always – capital expenditure very difficult – liaise with PMOs
  - Problem of end year surge (end-year flexibility or similar mechanism)
- Poor coordination with other functions to help smoothing
  - Cash & debt management often institutionally/geographically distant
- Poor coordination with central bank – no exchange of forecasts
- Confusion between budget execution and liquidity management
- Not enough performance analysis
- MDAs are lazy – just divide by 12

Outline

The Role of Cash Forecasting and Cash Planning
Building the Forecast: Tools and Techniques
Data and Resources
Using the Forecast

Putting the forecast to work…

- Supporting cash management
  - Smoothing the TSA; targeting a range of fluctuations
  - Policy focus on short-term borrowing and investment
  - Helps monetary policy; but cash flow forecasts still need to be passed to the central bank
- Supporting budget execution
  - Cash flow forecasts identify the cash profile a few months ahead
    - More realistic than profiles => may be different
    - Are cash resources adequate to deliver the budget?
    - May imply delaying release of allocations (or delaying payments)
- In the event of cash rationing, decisions should take account of budget priorities – informed by budget department
  - Deciding spending priorities and processing individual payments is separate from decisions about financing – and usually require different people/functions

Managing Deviations from Forecast

Cash Coordinating Committee

- Useful and widely used coordination mechanism for short-term cash management decisions – depending on the institutional arrangements
- Meets weekly, chaired e.g. by Head Treasury
  - Including also budget division, macro-fiscal unit, debt managers, central bank, tax authorities, possibly large spending ministries
  - Delegated authority for decisions within agreed parameters
- Main responsibilities:
  - Review cash flow outturns, and the comparison with forecasts
  - Review cash flow forecasts for the period ahead
  - Decide on action needed to ensure cash adequacy over the period ahead
- Supported by Cash Management Unit (CMU)
  - Responsible for forecast preparation, database, error analysis etc
  - Also preparation of scenarios and what-ifs
  - Policy recommendations (discussed with debt managers)

Presenting the Forecast 1/2

Prepared by:	**[name]**
Circulated on:	**[date]**
For meeting of [CCC] at [end Sept]	
Reference	**[as required]**

Note: Some months will have 5 weeks, or 4 weeks plus a stub, depending on the convention adopted

All figures rounded to 0.1 million local currency

		Outturn to end Week 3 month 9 (Sept), estimated outturn week 4				Forecast											
						Month 10 October				Month 11 November				Month 12 December			
Notes		Sept-wk1	Sept-wk2	Sept-wk3	Sept-wk4	Oct-wk1	Oct-wk2	Oct-wk3	Oct-wk4	Nov-wk1	Nov-wk2	Nov-wk3	Nov-wk4	Dec-wk1	Dec-wk2	Dec-wk3	Dec-wk4
1	**Opening TSA Balance**	8.2															
	Receipts																
2	Current Receipts	Detail as required															
3	Capital Receipts																
	Payments																
4	Salaries	Detail as required															
5	Good and Services																
6	Transfers																
7	Other current expenses																
8	Debt interest																
9	Investimento																
10	**Deficit/Surplus**																
	Other Capital Flows																
11	Redemptions (negative)	Detail as required															
12	Grants																
13	Other																
	Financing																
14	Loans and Credits	Detail as required															
15	Tbonds (as previously announced)			0.6				0.6				0.6				0.6	
16	Tbills (as previously announced)		0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2
17	**Implied closing TSA Balance**	9.0	9.1	7.7	7.9	11.4	9.4	8.7	6.9	6.9	7.3	7.3	6.2	6.9	7.6	6.9	9.3

Note: all figures below are illustrative only

Presenting the Forecast 2/2

		Sept-wk1	Sept-wk2	Sept-wk3	Sept-wk4	Oct-wk1	Oct-wk2	Oct-wk3	Oct-wk4	Nov-wk1	Nov-wk2	Nov-wk3	Nov-wk4	Dec-wk1	Dec-wk2	Dec-wk3	Dec-wk4
	Sensitivities/Contingencies																
18	Persistent shortfall in revenue				-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
19	Delays in grants received (timing only)						-0.3		0.3					-0.4			0.4
20	Assistance to flooded regions									-0.2	-0.2						
21	Roads expenditure brought forward						-0.1	-0.1			0.1	0.1					
22	Failed Auction							-0.6									
23	**sub-total**				-0.3	-0.3	-0.7	-1.0	0.0	-0.5	-0.4	-0.2	-0.3	-0.7	-0.3	-0.3	0.1
24	**cumulative**				-0.5	-0.8	-1.5	-2.5	-2.5	-3.0	-3.4	-3.6	-3.9	-4.6	-4.9	-5.2	-5.1
25	**Implied closing TSA Balance (worst case)**	9.0	9.1	7.7	7.4	10.6	7.9	6.2	4.4	3.9	3.9	3.7	2.3	2.3	2.7	1.7	4.2
	Possible policy options																
26	Invest surplus cash, for 3 wks				-1.0	-1.0		1.0	1.0								
27	Increase Tbill issuance				0.1		0.1		0.2		0.3		0.1		0.1		0.0
28	Extra Tbond auction, increase amount									0.7		-0.6		0.7			
29	As necessary, delays in expenditure approval											0.2	0.2	0.2			-0.6
30	**sub-total**				-0.9	-1.0	0.1	1.0	1.2	0.7	0.3	-0.4	0.3	0.9	0.1	0.0	-0.6
31	**cumulative**				-0.9	-1.9	-1.8	-0.8	0.4	1.1	1.4	1.0	1.3	2.2	2.3	2.3	1.7
32	**TSA Worst Case Adjusted**	9.0	9.1	7.7	6.5	8.7	6.1	5.4	4.8	5.0	5.3	4.7	3.6	4.5	5.0	4.0	5.9

Thank You!

Annexes

1. Past patterns need to be used carefully
2. Some Forecasting Examples
3. An Example of a Revenue Forecasting Template
4. Tasks of the Forecasting Unit

Annex 1: Use Past Patterns Carefully

Averaging can overlook some big fluctuations

Timing effects can be significant in different years

The size of the end-year surge can vary

Another Example

Something unusual in 2014!

Annex 2: Some Forecasting Examples 1/3

- Turkey
  - Monthly program converted to daily flows
  - Updated daily forecasts 3 months ahead (and to end of year) each month; forecasts for rest of month updated every day
  - Mostly bottom up – information flow, meetings (with large MDAs and tax authorities), also local Treasury offices. Some time series.
  - Internet portal for collecting spending requests from MDAs
  - Prepared within DMU (Public Finance DG of Treasury)
  - Smoothing with cash notes, repo and deposit auctions
- Hungary
  - TSA balance forecast by State Treasury (ST) – daily 2-3 months ahead bottom up and top down data (Central Bank also supplies its forecasts)
  - ST updates daily forecast during the day
  - AKK (DMO) manages in financial market – smoothing with Tbills and repo
  - Treasury responsible for forecast accuracy; but AKK assesses necessary buffer

More Forecasting Examples 2/3

- Romania
  - Forecasts prepared by Middle Office of DMU (DG Treasury & Public Debt)
  - Daily forecast each month updated monthly, mostly top down on own experience (rather than approved cash plans)
  - Spending transactions approved by local Treasury offices, visible to MO which updates daily forecast on the day
  - Cash profile influences Tbill & Tbond issuance; also borrow from banks in middle of month to cope with outflow early in month
- Sweden
  - Forecasts made within SNDO (DMO)
  - Both bottom up and top down – but focus on large flows only (rules for large transfers – helps predictability)
  - Monthly, then daily forecast based heavily on patterns, adjusted for macro factors, policy changes etc
  - Aim for zero end of day balance in TSA (issue Tbills with odd maturities)

More Forecasting Examples 3/3

- UK
  - Forecast above the line from within the Treasury – daily looking 19 weeks ahead, rolled forward each month
  - Ministries provide daily forecasts 1 month ahead: incentivised by financial carrots & sticks
  - Passed to DMO who add financing forecasts and take all borrowing/investment decisions with a view to targeting balance in TSA at low stable level.
- USA
  - Forecast up to 9 months ahead by Office of Fiscal Projections (part of Fiscal Service Bureau which in 2012 brought together the Financial Management Service and the Public Debt Bureau)
  - Requires budget agencies to submit forecasts of varying detail – also early warning of large payments.
- France
  - Daily forecast for 12 months prepared at beginning of year within AFT, updated during the year including with information from Budget Department and elsewhere
  - Inclusion of municipalities and related organisations in TSA adds complexity to forecasting (managed through strict information rules)
  - All spending units (inc lower levels of government) must inform AFT of all transactions greater than €1 million by 16.30 the day before
  - AFT plans to be long of cash on the day

Annex 3: An Example of a Revenue Forecasting Template

Authority	
Reference	[as required]
Date of Completion	[by [4] working days before end month; or more frequently]
Contact	[name, email etc]

All outturn figures rounded to nearest DX 0.1 million; all forecasts to nearest DX 1 million

This example submitted [4] days before end June

Note: "revenue" = cash flows into the Exchequer Account (ie net of retentions)

DX Million

Weekly Forecast	**Outturn to end Wk 18**	**Outturn (May)**				**Estimated Outturn June**				**Forecast July**					**Forecast August**				**Forecast September**			
		wk 19	**wk20**	**wk 21**	**wk 22**	**wk23**	**wk24**	**wk25**	**wk26**	**wk27**	**wk28**	**wk29**	**wk30**	**wk31**	**wk32**	**wk33**	**wk34**	**wk35**	**wk36**	**wk37**	**wk38**	**wk39**
Taxes on Income	423.1	16.6	18.7	22.9	45.7	28.7	32.3	39.5	79.0	18	22	16	19	32	20	22	22	47	31	34	34	71
Taxes on Goods and Services	649.8	27.3	30.7	37.6	75.2	27.8	31.2	38.2	76.3	30	35	26	32	53	33	36	36	76	33	37	37	77
Total	1072.9	44.0	49.4	60.4	120.9	49.7	55.9	68.4	136.8	48	57	43	51	85	53	59	59	123	64	71	71	148

Monthly Summary	**(Latest Approved) Budget**	**Outturn to end April**	**Outturn May**	***Var on May's forecast***	**June Estimated Outturn**	**Forecast**		
						July	**Aug**	**Sept**
Taxes on Income	1520.0	423.1	103.9	(-1.4)	179.6	110	113	181
Taxes on Goods and Services	2148.6	649.8	170.8	*(+0.7)*	173.5	170	174	190
Total	3668.5	1072.9	274.8	(-0.7)	353.0	280	287	371
Memo: latest approved budget profile		1079.3	278.6		342.9	284	293	353

New worksheet for each submission, although some information will be repeated.

Worksheet (and monthly forecast) rolls forward into next year

Notes

1

2

3

Include some space for comment or other remarks, in particular to explain major changes

Worksheets	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18

Annex 4: Tasks of the Forecasting Unit

1. Develop a [weekly/monthly] profile of agreed annual budget as a baseline for forecast preparation
2. Identify sources of information for updating the baseline, and developing forecasts for [3 months] ahead
3. Design forecast templates for [relevant contributors*]; prepare associated guidelines and instructional materials; and develop protocols for the supply of cash flow forecasts, consulting with [relevant contributors] and others
4. Make recommendations as necessary for tools (e.g. SharePoint) to receive or share forecasts; and to ensure their accurate aggregation
5. Ensure the receipt of cash flow forecasts from [chosen contributors] to format and timelines specified, following-up as necessary with responsible officials
6. Establish and maintain forecast and outturn data to detail specified; identifying any IT requirements, including back-up
7. Establish the flow of information from [Budget and Macro-fiscal departments] and others as necessary on any changes in expenditure, revenue or financing policies that might have implications for the profile of cash flows
8. Agree with Central Bank (and others) on: the procedures for movements between DX and FX accounts; and information flows between the Ministry and Central Bank (relating to forecasts and the TSA)
9. Develop a presentation of forecast data, sensitivities and financing options, that meets decision-makers' requirements
10. Analyze divergences between forecast and outturn (and also divergences between plans and outturns) with a view to improving the accuracy of future forecasts
11. Analyze past expenditure and revenue patterns with a view to enhancing the accuracy of raw forecast data
12. Prepare a quarterly report for senior management [and members of the relevant committee] reviewing forecast performance and making recommendations for future improvement