STUDY TOUR TO SLOVENIA FOR OFFICIALS FROM THE MoF OF UZBEKISTAN
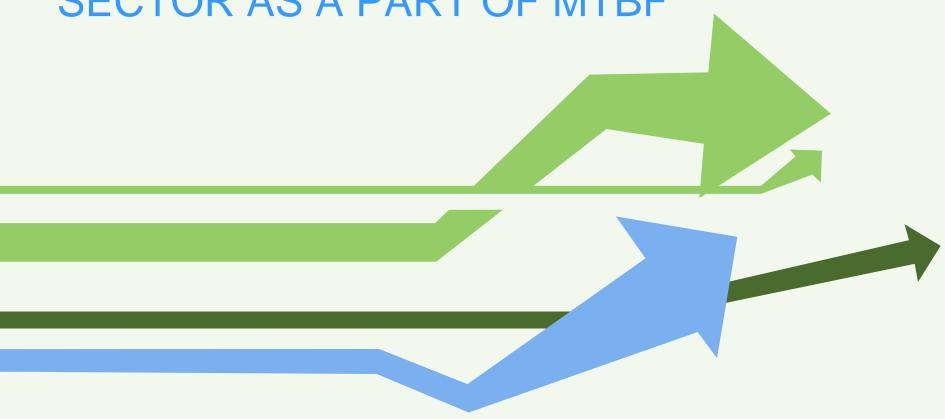
Slaven Mićković
Ljubljana, October 2011

3. PART: FORECASTING GOVERNMENT SECTOR AS A PART OF MTBF

About forecasting …

"The only thing we know for sure is that this forecast will be wrong. We don't know how much or in what direction, but it will be wrong."

words of the former director of the Ohio Legislative Budget Office

- • THE IMPORTANCE OF A MEDIUM-TERM PERSPECTIVE FOR BUDGETING:
  - Perspective beyond the immediate future: the future is inherently uncertain - the general trade-off is between policy relevance and certainty!
  - In practice, "multiyear" means "medium-term," i.e., a perspective covering three to five years including the budget year.

- THE IMPORTANCE OF A MEDIUM-TERM PERSPECTIVE FOR BUDGETING:
  - The feasibility in practice of a multiyear perspective is greater when revenues are predictable and the mechanisms for controlling expenditure well-developed.

- The annual budget must reflect three paramount multiannual considerations:
  - The future recurrent costs of capital expenditures,
  - The funding needs of entitlement programs (for example debt service and transfer payments) where expenditure levels may change, even though basic policy remains the same,
  - Contingencies that may result in future spending requirements (for example government loan guarantees).

- A medium-term outlook is necessary because the time span of an annual budget is too short for the purpose of adjusting expenditure priorities and uncertainties become too great over the longer term.

- At the time the budget is formulated, most of the expenditures of the budget year have already been committed: for example, the salaries of permanent civil servants, the pensions to be paid to retirees, debt service costs, and the like, are not variable in the short term.

- Other costs can be adjusted, but often only marginally: the margin of maneuver is typically no more than 5 percent of total expenditure.

- This means that any real adjustment of expenditure priorities, if it is to be successful, has to take place over a time span of several years!
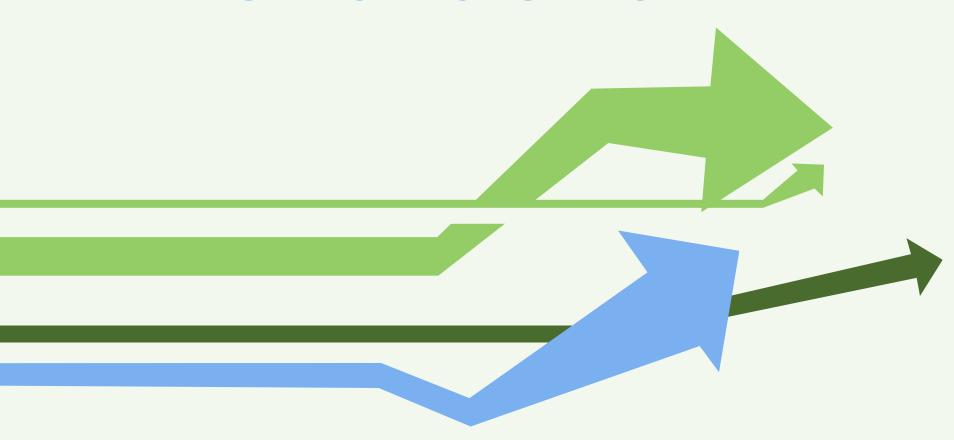
Why do we make forecasts?

- Forecasts attempt to predict how key variables in the economy are likely to move in the future, and in turn how they affect key economic policy objectives.

- We need to forecast any variable that affects these objectives significantly.

- For that purpose we should make forecasts of each sector of the economy, because there are many relations among economic variables.

Why do We Need Models?

- Modeling helps us to understand complex interactions and to take better policy decisions:
    - Policies have economy-wide effects;
    - Policies change behavior;
    - Long-run effects may be larger;
    - Monitoring and analyzing policies;
    - Forecating their impacts.

INTRODUCTION TO BUDGET REVENUE FORECASTING

Slaven Mickovic, September 2011

- One of the most difficult tasks in preparing a state budget is forecasting available revenues.

- Revenue forecasts are inherently difficult to make: too many assumptions that must be made and risks to be considered.

- Risks take the form of the intrinsically volatile and unpredictable nature of the economy, political decisions, policy changes and international events.

- Economic forecasting is the modern descendent of the ancient art of reading the omens.
- When something is wrong with the budget system many point the finger at revenue forecasters.
- The problem with the state budget process is not in the forecasts; it is in the way the forecasts are used.
- There is always pressure on the forecasters to "find" a few million of additional revenue in the forecast so that the pet projects of various groups can be funded.
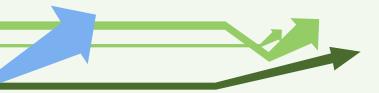
Why revenue forecasting is important ?

- While some error in the budget is to be expected, reasonably accurate forecasting of tax revenue is vital for efficient functioning of government.

- Because of the proclivity of the state to spend every dollar in the budget process, even small forecasting errors can have sizeable effects.

- The importance of this revenue estimation process is exacerbated by the lack of reserve funds - without a reserve fund, there is no margin for error in these revenue estimations.

Why revenue forecasting is important ?

- Underestimations of revenue may cause programs to be cut, employees to be laid off, and/or taxes to be raised on the citizenry. Severe underestimation of available revenues can also force the entire state budget to be recast in mid-year.

- When revenue were overestimated, tough decisions have been forced.

- Inaccurate forecasting can contribute to the deficits.

Budget Preparation

- Top-down approach
- Bottom-up approach

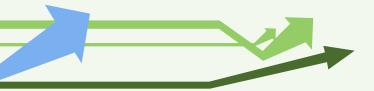Slaven Mickovic, September 2011

Top-down Approach

- Form macroeconomic forecasts.
- Decide on appropriate fiscal stance.
- Determine the revenue envelope.
- This yields an aggregate expenditure ceiling.
- Develop expenditure envelopes for each line ministry.
- Line ministries then prioritize spending needs and develop project allocations.
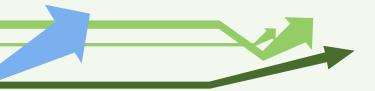
Bottom-up Approach

- Each line ministry reports its spending needs.
- Aggregate spending by all ministries to obtain total expenditure.
- Obtain a revenue forecast.
- The aggregate expenditure combined with the revenue forecast gives a deficit.
- Arrange financing for the deficit.
- Generally not the recommended approach.

Principles of good revenue forecasting

- Adoption of macro-economic assumptions
  - Macro-forecast must *cover* all revenue relevant macro-variables
  - Macro-forecast must be binding for revenue estimation period
  - Circular should indicate date for regular update and procedures for irregular updates
- Establishment of a formal forecasting procedure defining
  - Scope of forecast
  - Responsible agents/agency
  - Time-table

Principles of good revenue forecasting

- Use of built-in safeguards to ensure a balanced forecast:
  - The forecasting process should utilize the experience of academic and business economists in developing the state economic forecast.
  - As part of the revenue forecasting process and to the extent possible, the legislative branch should be included in the development of the economic forecast.
  - Adoption of a self-balancing institutional mechanism (consensus,experts).

Principles of good revenue forecasting

- Derive point estimates and range of variation.
  - Establish an organizational structure that aids the development of a single executive forecast, the Minister should understand the degree of uncertainty associated with it.
  - Carry out broad risk assessment of forecast.

- Publish summary results of forecast
  - Present past outcome and explain deviations from last forecast.
  - Highlight assumptions for new forecast.
  - Discuss main factors driving new estimates and risks to forecast.

Principles of good revenue forecasting

- Regular revisions of forecast and evaluation of forecasting strategy.
  - Short run: adjust for changes from macro-assumptions and policies.
  - Medium run:review of forecast errors: systematic errors? efficient estimate.
  - Review of data needs, methods, and forecasting capacity.

Why multi year forecasts?

- Although every budget prepared has long-term implications for the future of the state, it is often developed using short-term fiscal tools: no long-range strategy, essential to the fiscal planning of any private business, is undertaken at the state level.

- Instead, intrinsically volatile revenue forecasts are used to cast short-term budgets often finessed to meet the state's statutory requirement of a balanced budget.

Why multi year forecasts?

- It can be shown that this reliance on unpredictable revenues has been a one of major causes of budget shortfalls and deficits in the past.

- Where are you in the economic cycle.

- Longer term costs can take time to emerge.

- Takes time to implement change.

- Support expenditure control.

Revenue Forecasting Process

- Start with reasonable macroeconomic assumptions

- Develop an accurate and consistent 'constant-policy projection' for the fiscal aggregates

- If necessary, determine the policy measures needed to meet government's goals

Revenue Forecasting Process

- Monitor outturns and update forecasts
- If there are deviations from forecasts
  - reexamine the forecasting methodology
  - determine the source of the deviations (policy, differences in macro outturn,or forecast error)
  - recommend corrective policy actions

Forecasting Revenues: some key isseus

- A forecast is conditional, reflecting assumed conditions in the economy and in the rest of the world. If the assumptions change, our forecasts must change as well.

- Each time we make a revenue forecast, we must consider the level of aggregation. The pragmatic approach is to begin with a forecast of the aggregate variable.

- Disaggregation is necessary if some disaggregated variables behave differently from other variables.

Forecasting Revenues: some key isseus

- If economic policy changes, when do the changes begin to affect the economy?

- The impact of economic policy changes is often felt with a delay, also called a **lag**.

- Lags simplify forecasting, particularly if they are one year or longer. In that case, uncertainty about the change in the independent variable is no longer an issue, and the impact can easily be forecast.

Forecasting Revenues: some key isseus

- The tax base for a given tax is the event or condition that gives rise to taxation. It is defined in the law and in most cases is some economic event or condition.

- For example, the receipt of wages is example of taxable events.

Forecasting Revenues: some key isseus

- Even if it is possible to measure the tax base for past years, it may not be possible to make an accurate forecast of that base.

- For forecasting purposes, we usually use a proxy tax base to analyze the behavior of tax revenue and to make forecasts.

- A proxy tax base is an economic variable that is closely related to the actual tax base and for which data are available.

Forecasting Revenues: some key isseus

- Once we are sure that the effective tax rate is stable, and we have a forecast of the tax base, we can forecast revenue by multiplying the tax base by the tax rate.

- If the average tax rate is not stable, it may be possible to use the marginal tax rate instead. First, however, we must test whether this rate is constant over time.

Forecasting Revenues: some key isseus

- The marginal tax rate is defined as the ratio of the change in taxes to the change in the tax base:

$$\text{Marginal tax rate} = \frac{\Delta \text{Tax revenue}}{\Delta \text{Proxy tax base}}$$

- If the marginal tax rate is stable, we forecast the change in revenue by multiplying the change in the tax base by the marginal tax rate. In practice, we will use this approach when forecasting tax revenue with buoyancies.

Forecasting Revenues: some key isseus

- Elasticity refers to the change in tax receipts, in relation to the tax base, that occurs automatically—that is, in response to economic forces—under existing law.

- It is defined as the rate of change in taxes, excluding any effect of policy changes, divided by the rate of change in the tax base.

Forecasting Revenues: some key isseus

- Buoyancy refers to the total change in tax receipts relative to any change in the tax base.

- Buoyancy is the ratio of the rate of change in taxes, including any effect of policy changes, to the rate of change in the tax base:

buoyancy = b / t, where
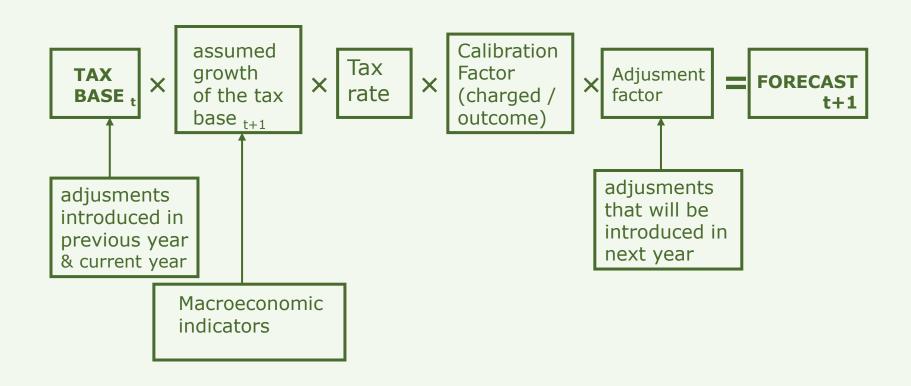
$$t = \frac{\Delta T}{T}, T = \text{tax revenue, and}$$

$$b = \frac{\Delta B}{B}, \text{ and } B = \text{tax base.}$$

Revenue forecasting approach

- Effective tax rate approach

- Tax elasticity approach

- Econometric approach

- Model based approach

- Nontax revenue forecasting approach

General forecasting model

$$\boxed{\text{TAX BASE }_t} \times \boxed{\begin{array}{l}\text{assumed}\\\text{growth}\\\text{of the tax}\\\text{base }_{t+1}\end{array}} \times \boxed{\begin{array}{l}\text{Tax}\\\text{rate}\end{array}} \times \boxed{\begin{array}{l}\text{Calibration}\\\text{Factor}\\\text{(charged /}\\\text{outcome)}\end{array}} \times \boxed{\begin{array}{l}\text{Adjusment}\\\text{factor}\end{array}} = \boxed{\begin{array}{l}\textbf{FORECAST}\\\textbf{t+1}\end{array}}$$

adjusments introduced in previous year & current year

adjusments that will be introduced in next year

Macroeconomic indicators

Effective tax rate approach

- Let the revenue received from a tax be R_T and the economic/proxy base of the tax be B_T...

- Calculate effective tax rate = R_T / B_T

- Apply the rate to B_{T+1} to arrive at a baseline forecast

Effective tax rate approach

- Note:
  - The effective rate is typically less than the statutory rate because of evasion, avoidance, collection lags, and weak tax administration.
  - The true base is typically less than the economic base because the tax law provides for exemptions, allowances, deductions etc.
- Need to adjust forecast for changes in policy or expected improvements in administration.

Measuring the tax base

Revenue source	Proxy tax base
personal income tax	wages
corporate income tax	profits
VAT/excises	consumption
Import duties	imports

- Sometimes GDP is the only base you have data for.

Hidden assumptions of effective tax rate approach

- Unchanged structure of the tax base:
  - A shift between low and high-tax (or tax exempt) goods may lead to a change in ETR.
- Unchanged tax system:
  - Changes in the rate levels and structures.
  - Tax progressivity may increase average tax rate.
  - More exemptions will lead to a decline in F/B.
- Unchanged compliance ratio:
  - Administrative improvements would increase effective rate.

Elasticity approach

- Establish a stable empirical relationship between growth in revenue (excluding effect of tax policy changes) and the growth in the base (the tax elasticity).

- Forecast revenues by multiplying the forecast increase in base by the elasticity.

- Then adjust for predicted changed in tax policy or administration.

Elasticity approach

- There is a related concept of buoyancy which represents change in revenue for a given change in the base, irrespective of tax policy changes.

- Note, it is elasticity, not buoyancy, that is the correct concept for forecasting future receipts.

Estimating elasticities

- Simplest method: calculate average ratio of percentage change in revenue to percentage change in base in those periods with no major tax changes (giving greater weight to more recent periods).

- More complicated: assume constant tax policy and use OLS to calculate

$$lnR_t = \alpha + \beta lnB_t + u_t$$

- Add in a dummy variable to account for years where significant measures introduced

$$lnR_t = \alpha + \beta lnB_t + \gamma D_t + u_t$$

What to expect in calculating elasticities

- Unit Elasticity
  - proportional rate structure
- Greater-than-unit elasticity
  - progressive rate structure
  - improved compliance
- Less-than-unit elasticity
  - specific rates
  - administrative compliance problems
  - high inflation

Model-based forecasting

- General equilibrium **models**
  - take into account the interdependence of the revenue system and the macroeconomy
  - often too complicated to be practical
- Micro models based on actual tax returns
  - can complement the elasticity approach to arrive at more accurate forecasts
  - particularly useful for tax policy changes that alter the tax base (e.g. changing allowances, depreciation rules, etc.)
  - requires a large investment in resources and statistical information

Forecasting Non-tax Revenues

- Ad hoc methods refer to any approaches other than the mentioned before above.

- Ad hoc methods are usually required when there are not enough data or historical stability for more sophisticated techniques.

- If the fundamental economic, social, and institutional relationships underlying or driving a particular variable are shifting, more sophisticated techniques often prove inadequate.

Forecasting Non-tax Revenues

- ## Have to get creative!
  - Fees: projected to increase by the same rate as real income?
  - Grants: estimate commitment of donors excluding any loan element.
  - Profits from the central bank: look to monetary program and agreement between the central bank and the government.
  - Mineral royalties: a function of world export prices?
  - Operating surplus of public enterprises: look at factors influencing output prices and input cost.

Introduction to budget expenditure forecasting[1]

Forecasting expenditure

- Because many decisions about government expenditure are political in nature, there is less scope for relying on economic relationships in forecasting the level of government expenditure than in forecasting that of revenue.

- From a macroeconomic point of view, total expenditure is a policy instrument and not a passive outcome.

Forecasting expenditure

- Broadly speaking, expenditure can be divided into two categories, discretionary and nondiscretionary:

  - **Discretionary expenditure** is decided from year to year in the budget and can be increased or decreased in the short run.

    It can be estimated on the basis of decisions made by policymakers, as reflected, for example, in a budget document.

Forecasting expenditure

– **Nondiscretionary expenditure** consists of liabilities of the government stemming from a contract or as a result of existing law.

The main nondiscretionary items are interest payments, social security payments, unemployment benefits, and pensions.

To forecast these items we need to know what determines them and try to estimate the precise relationship.

Nondiscretionary expenditure cannot be changed by policymakers in the short run.

Wages and salaries

- Expenditure on wages and salaries depends on:
  - government policies;
  - the number of civil servants and military personnel;
  - the average wage rate;
  - wage developments in the private sector; and
  - changes in the cost of living.

Subsidies and transfers

- Government expenditure on subsidies and transfers represents the cost of programs designed to achieve certain public objectives, including income redistribution.

- Once established, such programs are difficult to shrink or eliminate.

- Factors that influence this expenditure item include:
    - government policies;
    - the rate of growth of real GDP;
    - the rate of growth of the population covered by the programs;
    - the rate of inflation; and
    - prices for imports and exports.

Expenditure on goods and services

- Outlays for other goods and services are the main operating expenses of the government.
- They are to a large extent discretionary and thus depend mostly on government policies.
- However, for government to continue operating in an efficient way, there must be some relationship between this expenditure and the size of the civil service.
- To maintain the level of expenditure in real terms, this expenditure category should move with inflation.

Interest payments

- Government interest payments depend on:
  - the size of the public debt;
  - the composition of the debt (that is, between foreign and domestic lenders);
  - the interest rates applicable to the different parts of the debt (including whether they are fixed or variable);
  - the rate of inflation (for domestic interest); and
  - the exchange rate (for foreign interest).

Capital expenditure

- Capital expenditure frequently bears the brunt of any planned fiscal tightening.
- Capital projects are not so easy to turn on and off, especially when they depend on external financing.
- Capital spending in most countries is set in the context of a rolling, multiyear investment program.
- In projecting capital expenditures, therefore, we need to take careful account of spending already in the pipeline that is difficult to reverse.

Capital expenditure

- Capital expenditures depends on:
  - government policies;
  - foreign financing;
  - the number and scope of ongoing projects;
  - the exchange rate; and
  - the rate of inflation.

Forecasting noninterest expenditure

- Government spending reflects political decisions.
- A forecast of expenditure could start with what we know about fiscal policy in the year ahead: this can be learned from consulting the budget for that year and from an assessment of the impact of announced changes in fiscal policy.
- The approved budget is thus a useful starting point, but the following points should be kept in mind:
  - The budget sets an upper limit on expenditure.
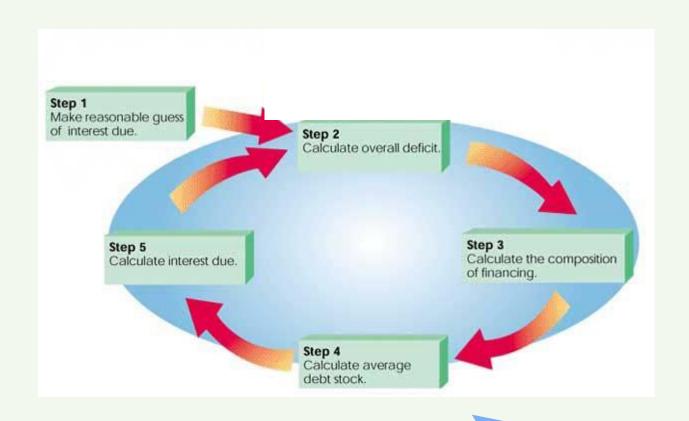 - During the year supplementary budgets are sometimes added.

Forecasting noninterest expenditure

- To forecast expenditure in the absence of a reliable budget, we often assume that fiscal policy will be unchanged.

- What this means depends on what fiscal policy was in the preceding years.

- The following are some of the changes that may have occurred:
  - loosening or tightening of fiscal policy;
  - changes in staffing;
  - changes in real wages;
  - changes in subsidy policies and
  - changes in the level of the debt.

Forecasting interest payments

- To forecast interest you need to know:
  - the rate of interest for each category of debt; and
  - the average stock of debt in each category.

Forecasting interest payments

Step 1
Make reasonable guess
of interest due.

Step 2
Calculate overall deficit.

Step 3
Calculate the composition
of financing.

Step 4
Calculate average
debt stock.

Step 5
Calculate interest due.

Revenue & Expenditure Forecasting

Good luck!

THANK YOU!