Macroeconomic Modeling for Planning in Nepal

BRIEF OVERVIEW

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1. Backgrounds
2. Initial Attempts
3. Models used in previous plans
4. MDGs consistent Macroeconomic Model
Historical Background

• In the early 1980’s, individual researchers first attempted to use statistical models in Nepal.
• Macroeconomic modeling has been started with introduction of a multi-sector, economy-wide model by NPC and IIDS in 1985.
• The Water and Energy Commission developed a macro model for forecasting energy demand in 1987.
• Ministry of Industry developed a macro-economic model integrate with the Leontief input-output framework comprising 39.
• A similar version of the macroeconomic model was also used in the formulation of the Eighth Plan.
• In 1990, a simple macroeconomic accounting framework was employed to examine the possibility of policy coordination between exchange rate policy and fiscal policy.
Historical Background

• A slightly different model in the framework of the standard flow-of-funds accounting, commonly used by the WB and IMF was developed for the National Planning Commission Secretariat.

• A computer-based model namely, Reference Energy System-Integrated Macroeconomic Input-Output (RES-IMIO) Model was developed and used in the Perspective Energy Plan (PEP) in 1995.

• In Tenth Plan, the integrated macro and input-output model was used to set the growth rates and the investment.

• In the Water Resources Strategy Formulation (WRSF) - Phase I also used Revised Minimum Standard Model to project the resources availability required for meeting the investment demand.

• Macro economic Model was used in National Water Plan (NWP) to assess the macroeconomic implications of the investment on Water Resources sector on the national economy.
Macroeconomic Modeling for Planning in Nepal
Till Seventh Plan **no framework** (quantitative) were used.

Plan investment was allocated between private and public sector on the **ad hoc basis**.

Development expenditure of the public sector was estimated based on assumption of some **predetermined percentage of total investment**.
Initial Attempts

- “A Regionally Disaggregated Planning Model” constructed with the technical and financial support of UNESCAP and Social Institute in 1984/85 is the first attempt for multi sector, economy wide modeling in Nepal.

- It was build as:
  - A framework for economic analysis through alternative policy simulation
  - To bring improvement in development planning paradigm and its method.
Initial attempts

- Developed to represent ecological/development regions at fairly disaggregated level
- A separate sub model of each region and two foreign region: India and Rest of the world
- A small size input out table for 1981/82 of 9X9 was compiled for model simulation
- The model specification was highly complex in situation where there was no enough experts available
- The model was revised using 1986/87 data but it could not be utilized so far
The Model consists of 31 behavioral equations, 21 exogenous and 18 lagged variables.

The model was constructed using time series data of 1974/74 to 1988/89.
RMSM-X Model used in Eighth Plan

- RMSM-X Model was developed with the support of World Bank for Macroeconomic Analysis during Eighth Plan Period with **objectives** to:

1. Evaluate consistency among different sources of data and data gaps
2. Evaluate existing economic conditions
3. Assess overall macroeconomic performance
4. Analyze consistency of Eighth Plan Macro variables.
Integrated Macro Model and Input-output table was developed to fix growth rate and determine investment level.

- Period covered was 1985-2000
- It consists of 31 behavioral equation and 20 identities
- It consists of five blocks: Value Added, Consumption, Money Supply and Prices, Employment, Import, Taxes
Millennium Development Goals consistent Macroeconomic Model (MDGcMEM)
MDGs consistent macroeconomic model (MDGcMEM)

- Developed a in 2013,
- Aim is to:
  - providing a set of sectoral projections consistent with each other and also with macroeconomic goals and policies, and taking into account the level and composition of investment required to achieve MDG targets and its potential effect on the economy.
- The specific Objectives is to
  - provide input for preparing MDG based long term development planning;
  - strengthen coherence between planning and MTEF/budgetary framework;
  - provide a monitoring & evaluation framework; and support the national policy dialogue & negotiations with development partners.
Introduction of the model

- It is a Keynesian type of macroeconomic model in which social sector (MDG component) is included in the system; and output/price are determined endogenously.

- It consists of:
  - 6 blocks: National account, Monetary, Government Finance, BOP, Price and Social Sector
  - 74 equations (43 behavioral and 31 identities).
  - 92 variables.

- Government expenditure is the key policy variable.

- Based on yearly time series data starting from 1992/93.
The model uses a Cobb-Douglas type of production function in order to estimate the sectoral GDP.

GDP is decomposed into agriculture, industry and service.

The sectoral investment and the gross fixed capital formation are estimated separately.

The model follows a flexible price regime as the GDP deflator is obtained endogenously.

Sectoral employment and poverty rate are obtained from the survey data.

Recognize the role of the private sector appropriately assuming that public investment "crowds in" private investment,
The model addresses MDGs in 3 ways –

- incorporating poverty-growth nexus,
- making public expenditure a policy variable in order to link the investment requirement to attain MDGs and
- allowing availability of foreign assistance in order to meet the expenditure requirements.

Considered remittance to be one of the main driving factors in economy.

Highlights the role of remittance through income and consumption channels.

Remittance is also considered to be one of the determinants for reducing poverty in Nepal.

Use various dummy variables to capture the effects of political instability, strikes, load shedding, weather conditions and take care data outliers.
THE CRUX OF THE MODEL
Impact of changes in govt capital expenditure

- Revenue
- Deficit
- Internal or external loan

GBO
Impact of changes in govt capital expenditure

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- Internal or external loan

GBO

Monetary
- Claims on Govt.
- Domestic Credit
- Net domestic assets
- Money Supply
- Bank Deposit

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BOP

- Import and trade balance
- Foreign aid
- Exchange rate
- BOP surplus/deficit
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BOP

- Food and Beverage
- Non-food and services
- Overall inflation

Price

National Planning Commission

December 2011
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BOP

Real Sector
- Food and Beverage
- Non-food and services
- Overall inflation

Price

- Sectoral GDP
- Overall GDP
- Investment
- National saving

- Import and trade balance
- Foreign aid
- Exchange rate
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- Sectoral GDP
- Overall GDP
- Investment
- National saving

Real Sector

- Poverty rate
- Employment rate
- Inequality
- GDP growth

MDGs

National Planning Commission

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Methodology

Take care of:
- sign of parameters
- t-statistics
- adjusted R–square
- D-W test
- Use AR(1), MA(1) and dummy to improve the equation

Forecast/Simulation
- Baseline
- Other

- Run the model
- Check in-sample forecasting performance
The exchange rate of the Nepalese currency remains the constant

Number of tourists arrival will increase by 15 percent each year;

Sectoral employment follows historical growth

Indian GDP growth rate and Indian CPI obtained from Indian 12th Five Year Plan

GDP growth rate of Middle East countries derived from World Economic outlook
Conclusion and way forward

- MDGs indicators were very simple and straight but integrating the SDGs indicators in model needs more rigorous discussion and exercise due to its huge numbers of targets and complex inter-linkages.
- Data problems require that the model needs to be simple
- Robust parameters needed for generating SDGs consistent macroeconomic framework
- Macroeconomic modeling works in region confirm that a variety of approaches are needed for SDGs based plans
- Models are not panacea for economic development. Effective and sustainable economic, social and political realities matters.
- Institutionalization and mainstreaming of macro model is necessary
Conclusion and way forward

• Capacity development of related agencies in modeling activities need to be enhanced.

• UNESCAP should assist the developing countries in following activities:
  - Technical assistance in development of country specific and regional model to address SDGs.
  - Technical assistance to National Statistical Institutions in integrating the SDGs indicators in National Surveys.
  - Capacity development of national experts in modeling
Thank you for your attention