Maldives

National Macroeconomic Forecasting And Policy Simulation Models
Content

• Maldivian Economy
• Forecasting Models
  • Process
  • Tourist Arrivals
  • GDP
  • Revenues
Real Sector

- Real GDP per capita in 2015: US$ 6,088.68 (projected)
- High dependency on tourism - contributes about 30% to GDP
- Highly susceptible to external shocks
- Share of fisheries sector is small, but still a key source of employment for many
- Unemployment rate (broad definition): 28% in 2010

Co-Movement of GDP and Tourism

- Financial crisis
- Indian Ocean tsunami
Real Sector - Prices

• Inflation peaked in early 2012, reflecting the introduction of the GST and the devaluation of rufiyaa
• Gradually back to lower levels as these one off effects dissipated
• Food has a weight of 23.8% in the CPI basket
• Exchange rate pass through is extremely high, and international commodity price changes are reflected to a high degree
Fiscal Sector

- Government expenditure consistently exceeds revenue
- Major revenue source was the import duty until 2011
- Now, GST (especially T-GST) and the business profit tax are the main sources, and import duty rates have been reduced
- Largest share of government expenditure goes to employee remuneration
- 70% of total expenditure is recurrent expenditure
Fiscal Sector - Debt

• Total debt has been rising sharply since 2008, mainly fuelled by rising domestic debt
• Newly introduced fiscal responsibility act stipulates that the debt-to-GDP ratio should be at most 60% by the end of 2016, and maintained below the threshold thereafter
External Sector - Trade

• Have consistently been experiencing trade deficits
• Current account deficit is expected to be at 7% of GDP in 2015
  • Trade deficit is expected to be at 56% of GDP in 2015
  • Services account surplus is expected to be at 72% of GDP in 2015
External Sector - Reserves

- Gross international reserves consist of the reserve assets held by MMA
  - Built up mainly through tourism sector activity (tax receipts) and the accumulation of foreign currency assets by banks
- Challenge to intervene in FOREX market due to low reserve levels
- Reserves improving in recent years
Monetary Sector – Credit Growth

• Rapid increase in credit to government after 2008 partly reflects the widening fiscal deficit
• Expansion of credit to private sector stalled after 2008
  • Global financial crisis
  • Deterioration in the asset quality of banks (increase in NPLs)
  • Diverted to investment in T-bills
Monetary Sector – Interest Rates

• Interest rates increased dramatically for T-bills of all maturities reflecting the widening fiscal deficit

• Tap system introduced in 2014 to curb the increasing interest burden on the government
  • This did not reduce T-bill investment, reflecting the lack of other investment opportunities in the domestic market

• T-bill interest rates mechanically halved in November 2015.
Forecasting

Process
Macro Modeling

• Budget Process
  • Macroeconomic Policy Coordination Committee
  • Medium-term budgets
  • Policy approval

• Medium Term Economic Framework
  • Being built with the help of World Bank
  • Brings together isolate models
  • Behavioral linkages
  • Excel based
Forecasting Models

GDP
Procedural Change

- National Bureau of Statistics (NBS) to discontinue production of annual medium term GDP forecasts - from 2015
- NBS to produce Quarterly National Accounts (QNA) – first release 20th October
  - NBS will produce actual GDP, quarterly and annually
  - Not the international best practice for statistical agencies to produce annual forecasts
- EDPD/MoFT to produce annual forecasts for GDP growth and Nominal GDP
Forecasting model

Univariate time series model

• Using the Quarterly Real GDP series (2003Q1 to 2015Q2)
• Model using information on its own past values
• AR (1, 4) SARIMA(0,1,0)_4 model

Advantages

• Simple to model
• Often found to produce better forecasts than structural models
• Incorporates information of the economic growth up to Q2 2015

Disadvantages

• Retrospective
• Cannot dissect the growth impact of specific items
• A-theoretical
Forecast – Univariate time series model
GDP GROWTH: 2015-2018

Annual GDP ARIMA(1,1,0) model
Annual GDP External Demand Model
QRGDP Trend + AR(1) + Seasonal dummies
QRGDP AR(1,4) + SARIMA(0,1,0,4)
### NGDP Forecasting method

#### 2014 GDP Expenditure breakdowns

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>GDP (EXP)</td>
<td>1</td>
</tr>
<tr>
<td>C (Household Consumption)</td>
<td>0.6</td>
</tr>
<tr>
<td>G (Wage bill)</td>
<td>0.3</td>
</tr>
<tr>
<td>I (Imports of Capital)</td>
<td>0.1</td>
</tr>
<tr>
<td>X (Imports of Goods)</td>
<td>0.05</td>
</tr>
<tr>
<td>X (Imports of Services)</td>
<td>0.05</td>
</tr>
<tr>
<td>M (Govt Capital Expenditure)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

#### Forecast growth for indicators 2015-2018

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imports of Household Consumption Goods</td>
<td>1</td>
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<tr>
<td>Wage bill budget and forecast</td>
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<tr>
<td>Intermediate consumption costs budget and forecast</td>
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<tr>
<td>Imports of capital goods</td>
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<tr>
<td>Imports of building material</td>
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<tr>
<td>Govt Capital Expenditure budget and forecast</td>
<td>0.1</td>
</tr>
<tr>
<td>Exports of goods</td>
<td>1</td>
</tr>
<tr>
<td>Tourism Bednights</td>
<td>1</td>
</tr>
<tr>
<td>Imports of goods</td>
<td>0.9</td>
</tr>
<tr>
<td>Wage bill budget and forecast</td>
<td>0.05</td>
</tr>
<tr>
<td>Govt Capital Expenditure budget and forecast</td>
<td>0.05</td>
</tr>
</tbody>
</table>
Nominal GDP Series - October 2014 update

Source: National Bureau of Statistics (October 2014)
Issues with GDP forecasting

• Disconnected methods to forecast RGD and NGDP
• Not a critically scrutinized model
Forecasting Models

Tourist Arrivals
Medium term forecasts

• A global tourism elasticity-based model for medium term forecasts
  • Maldives is hyper-sensitive to global tourism, with an estimated elasticity of 184 percent
Medium term model

• $\text{LOG(ARR}_{\text{MDV}}) = C(1) + C(2) \cdot \text{LOG(ARR}_{\text{GLOBAL}}) + C(3) \cdot \text{SHOCK} + \text{AR}(1)$

• Global arrivals forecasts from UNWTO is included.
Within year forecast

• Temporal (or seasonal) based model for within year forecasts
  • Seasonal patterns apparent and consistent
  • High dependency on European tourists, peak season in Maldives corresponds to European winter months of December-February.
  • However, since of late China has emerged as the single largest source of tourists and also the one which has shown the strongest growth. Interestingly, Chinese arrivals also reflect strong seasonal features but with effects opposite to that of the European segment.
Within year (short term) model

• Calculate weights for main markets, namely, China, Europe and RoW.
• Run AR models for each market
• Multiply forecasts from AR models with weights to obtain short term monthly forecasts
Issues and updates

• Both models have relatively large standard errors.
• Shock variable (a binary variable) is exogenous to the model and is captured for only 1 period. This is not very robust and a better approach would be to have some indication of duration of a shock through an appropriate formulation.

• Models performed poorly in recent years.
• New research to update the model on-going.
Forecasting Models

Revenues
Revenue Forecasting

• Historically done by collecting agencies.

• New Medium Term Economic Framework (MTEF) being built. Same models are incorporated to the MTEF.
MIRA Revenue

- Over 90% of 2014 MIRA revenue comprise of 7 revenue codes:
  - GST (Tourism and Non-Tourism Sectors)
  - BPT
  - Tourism Land Rent
  - Tourism Tax / Green Tax
  - Lease Period Extension Fee
  - Bank Profit Tax
  - Airport Service Charge

[Graph showing MIRA revenue by year from 2010 to 2014, with a breakdown of revenue by category (GST, BPT, etc.).]
Tourism Sector GST

- Bednights information and forecast – from the Ministry of Tourism

- Spending Rate
  - Calculate the ‘consumption’ of the tourism sector
    - Equals to TGST collection / TGST rate
  - Calculate Spending per tourist per bednight (spending rate)
    - Tourism sector consumption / bednights
  - Estimate the spending rate for the projection period
    - Take a moving average of the past years’ spending rate
    - Increase it by a rate indicative to the growth in past year’s spending rate and inflation

- TGST revenue = Spending Rate x Bednights x TGST Rate
Non-Tourism Sector GST

• Calculate the consumption subject to GST in the non-tourism sector
  • Equals to GGST collection / GGST Rate
• Analyse the consumption trends
• Analyse GDP and inflation
  • GDP forecast not available at the time of projection
  • Estimate a crude growth rate for the real GDP based on past growth rates
  • Estimate a crude inflation figure for the projection period based on past figures
  • Estimate nominal GDP growth based on inflation and real GDP growth rate
• Estimate the consumption for the projection period based on moving average of past consumption levels, increased by nominal GDP growth rate.
  • Additional weight may be necessary to reflect growing compliance
• GGST revenue = Consumption x GGST Rate
Airport Service Charge

- Tourist arrivals estimates are obtained from the Ministry of Tourism
- Calculate the share of foreign departures based on information obtained from Airport operators
  - Share of foreigners in the total departures: 88.4%
  - Share of tourists among foreign departures: 92.1%
- Estimate foreign departures
  - Tourist arrivals divided by ‘share of tourists among foreign departures’
- Estimate total departures
  - Foreign departures divided by ‘share of foreigners in the total departures’
- Estimate Maldivian departures to abroad
  - Total departures minus foreign departures
- Multiply with respective ASC rates
  - USD 25 for foreigners and USD 12 for Maldivians
- Airport Service Charge = ASC from Foreigners + ASC from Maldivians
Economic Forecasting in Maldives

• Various models, various institutions and various software.
• The teams involved in forecasting have close dialogue and work together on some models (eg: new tourist arrivals model)