

# **APPROACHES TO MACROECONOMIC MODELLING AND FORECASTING – A PERSPECTIVE BY THE CENTRAL BANK**

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# OUTLINE OF THE PRESENTATION

- Review of the recent Macroeconomic Developments
- The Case for Macroeconomic Model :
  - *Recent Shift in Policy Paradigm : From Stability to Growth*
  - *New Monetary Policy Process of the Bank*
- Bank of Ghana's Approach to Forward Looking Inflation
- Attempts by the Bank to build a Macroeconomic Model for the Bank

# **REVIEW OF THE MACROECONOMIC DEVELOPMENTS**

# REVIEW OF THE MACROECONOMIC DEVELOPMENTS

- **Macroeconomic Situation before 2001:**
  - High inflation - 40.5%;
  - High interest rates – 50%;
  - Deteriorating exchange rate depreciation – Over 50%;
  - High unsustainable debt (huge domestic debt GDP ratio) - 24%; and
  - Low gross international reserves – 0.8 months of imports of goods and services

# REVIEW OF THE MACROECONOMIC DEVELOPMENTS

- **Measures to Restore Stability By the Current Government**

Enhance Revenue Generation

Greater Control of Government Expenditure and;

Some Structural Reforms such as:

- *External debt relief through HIPC initiative,*

- *Full cost recovery- that is addressing major source of fiscal instability; Petroleum and utility price adjustments*

# REVIEW OF THE MACROECONOMIC DEVELOPMENTS

- The fiscal/monetary policy framework focused on reduction in domestic debt to GDP ratio:
  - To provide an anchor for fiscal policy;
  - To impose financing constraints on the budget to allow monetary policy focus on bringing inflation down without putting undue pressure on the domestic interest rates

# REVIEW OF THE MACROECONOMIC DEVELOPMENT

- **Achievements at the End of 2005 :**
  - Low Inflation rate – 14.8% (**12.1%** at the end of February 2006)
  - Low Interest Rate (91-day Treasury Bill Rate) - 11.8%
  - Relatively stable exchange rate depreciation - 0.9% (against US\$)
  - Relatively low domestic debt GDP ratio - 13.1%
  - Gross international reserves build-up to cover - 3.46 months of imports of goods and services

# REVIEW OF THE MACROECONOMIC DEVELOPMENT

- Achievements in the midst of rising crude oil prices, worsening Terms of Trade and the implementation of the new petroleum pricing mechanism.
- These macro statistics in the face of difficult external environment shows the resilience of the economy in 2005
- Can the central bank and the government be able to move the economy from stability to growth while continuing with the macroeconomic reforms?

## **THE CASE FOR MACROECONOMIC MODEL:**

- *Transition from Stability to Growth*
- *New Monetary Policy Process*

# **FROM STABILITY TO GROWTH – ROLE OF MODELS**

# FROM STABILITY TO GROWTH – ROLE OF MODELS

- With the achievement of the relative stability of the economy
- Attention has now been shifted from just corrective measures to the issue of moving the economy from stability to growth
- However the discussion is now centred on the issue of trade-off between stability and growth

# FROM STABILITY TO GROWTH – ROLE OF MODELS

- This was at the core of the symposium organized by the Bank of Ghana on “From Stability to Growth”
- Main issues were:
  - (i) whether there is a huge trade off between sustaining stability and achieving growth?
  - (ii) Or whether both can be achieved?

# FROM STABILITY TO GROWTH – ROLE OF MODELS

- Answers to these questions are not straight forward
- Requires a well-articulated dynamic interactions between and among the various macro variables and sectors of the economy
- Deriving these dynamic interactions provides a strong analytical background to policy (Evidence Based Policy Making)

# FROM STABILITY TO GROWTH – ROLE OF MODELS

- Current awakening makes it critical to understand the macroeconomic structures of the Ghanaian economy
- To aid policy makers to know the transmission mechanism that exist in the Ghanaian economy
- Again, offers policy makers the opportunity to appreciate the expected impact of their decisions on the various identifiable sectors of the economy

# FROM STABILITY TO GROWTH – ROLE OF MODELS

- Makes it imperative to have a macroeconomic model to facilitate the analyses of the role of monetary policy, fiscal policy, exchange rate policy and other public policy issues on the various structures of the Ghanaian economy
- Again, provides adequate basic macroeconomic relationships which drives macroeconomic adjustment in Ghana
- This is very important to provide the basis for the policy makers in their quest to move the economy from stability to growth.

**NEW MONETARY POLICY PROCESS –  
ROLE OF MODELS**

# NEW MONETARY POLICY PROCESS – ROLE OF MODELS

- One of the structural measures to rescue the economy from further deterioration was the passage into law of the Bank of Ghana Act at the end of 2001
- Refocused the central bank on the major task of inflation control and away from the developmental activities
- Following the new arrangements, Monetary Policy Committee (MPC) was established in 2002
- MPC was modeled after that of the Bank of England to formulate monetary policies

# NEW MONETARY POLICY PROCESS – ROLE OF MODELS

- And communicates its decision to the public, “independent of the instruction from Government or any other authority” (Bank of Ghana Act 2002)
- New arrangements focus on monetary management that ensures a systematically low and competitive interest rates and low inflation anchored on low inflationary expectations.
- Again ensures a stable exchange rates, reasonable spread between lending and savings rates, and the establishment of long-term capital markets

# NEW MONETARY POLICY PROCESS – ROLE OF MODELS

- Following this the MPC has indicated its commitment to anti-inflation strategy using the inflation-targeting regime to attain and maintain a low stable inflation
- The MPC in practicing inflation targeting focuses on controlling liquidity and setting interest rates to reflect the underlying cost of capital as well as to steer inflationary expectations
- This is done through detail analyses of data on the economy

# NEW MONETARY POLICY PROCESS – ROLE OF MODELS

- Analyses include the fiscal outlook, monetary and inflation developments, external sector, financial stability, and the real sector of the economy
- Can only be done effectively if the Committee have a clear understanding of the macroeconomic structures of the Ghanaian economy
- Also, the Committee needs to understand the transmission mechanism of the monetary policy
- Hence the input of a model to inform policy decisions

# NEW MONETARY POLICY PROCESS – ROLE OF MODELS

- Adoption of the fully fledged inflation targeting framework requires as an essential condition an operational model, which can forecast inflation using all the relevant available information
- Makes a background macroeconomic model for the Bank inevitable
- Model to explain clearly the macroeconomic structure of the economy as well as the transmission mechanism of the monetary policy

**BANK OF GHANA'S APPROACH TO  
FORWARD LOOKING INFLATION**

## BANK OF GHANA'S APPROACH TO FORWARD LOOKING INFLATION

- Given the significant lags in the transmission of monetary policy, the MPC bases its monetary policy decisions upon its forecasts of inflationary pressures in the economy
- Following this the Committee formulates a projection of inflation using a partial equilibrium model as well as other available information to inform its judgement

# Bank of Ghana Single Equation Model For Forecasting Inflation

- The forecasts are derived from :
  - *Auto-Regressive (AR) Process*
  - *The Error Correction Forecast Model (ECFM)*
  - *Scenario Analysis*

*Summary of the Outcome of the  
Forecasts for 2006*

## The Outlook and Potential Risks

- Key factors identified as sources of risks:
  - Volatile nature of crude oil prices on the international markets
  - Likely adjustment in utility costs in the first quarter of 2006

**BANK OF GHANA**  
**5 SECTOR MACROECONOMIC**  
**MODEL**

# BACKGROUND

- **The case for macroeconomic model :**
  - *the transition of the economy from stability to growth*
  - *the new monetary policy process*
- Given this the Bank has championed the process of developing a comprehensive macroeconomic model for Ghana
- The Bank intends to:
  - *Start with an initial small model*
  - *Expand it further to allow for micro impact of macro policies*
  - *More policy oriented, though not lacking academic rigor*

# BACKGROUND

- **Emphasis is placed on :**
  - Consistent and coherent structure
  - Consistency with data and ability to interpret history
  - Ability to forecast main macro variables of policy relevance to the bank and the economy as a whole

# BACKGROUND

- However, the Bank is not aiming at :
  - *a perfect model*
  - *being more “model centric”*
  - *changing forecast discussions*
  - *replace models with intuitive discussions and discretion*

# Structure of the Model

- A small open economy macro model focusing on 5 key sectors:
  - Aggregate demand (IS relation)
  - Aggregate supply (Philips curve)
  - Real Money
  - External sector (as measured by real exchange rate)
  - A monetary policy rule

# Methodology

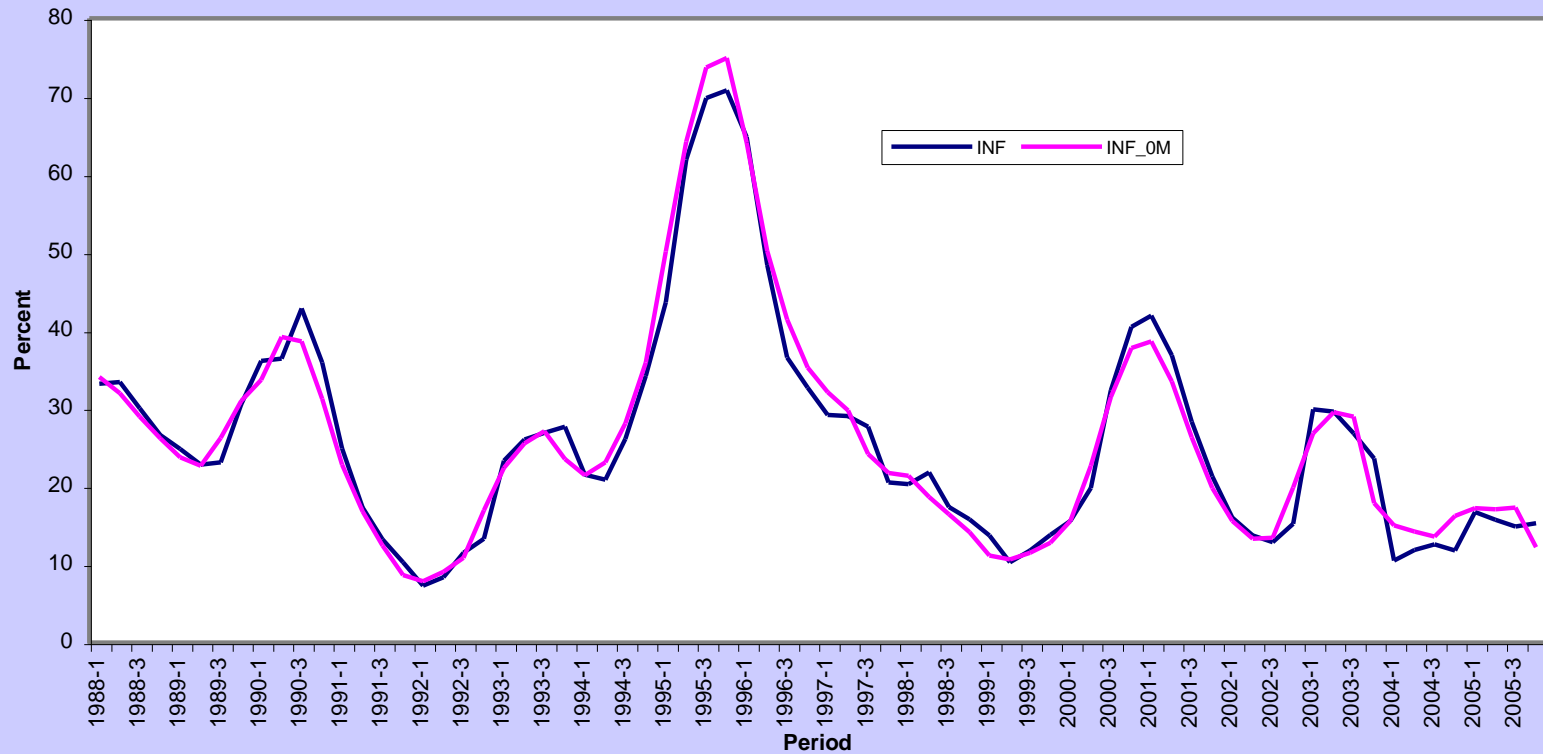
- System estimation to identify parameter estimates
- In particular we used SUR, which has an advantage of paying attention to contemporaneous correlations between unobserved error terms belonging to different equations in the same system.

# Results of System Estimations

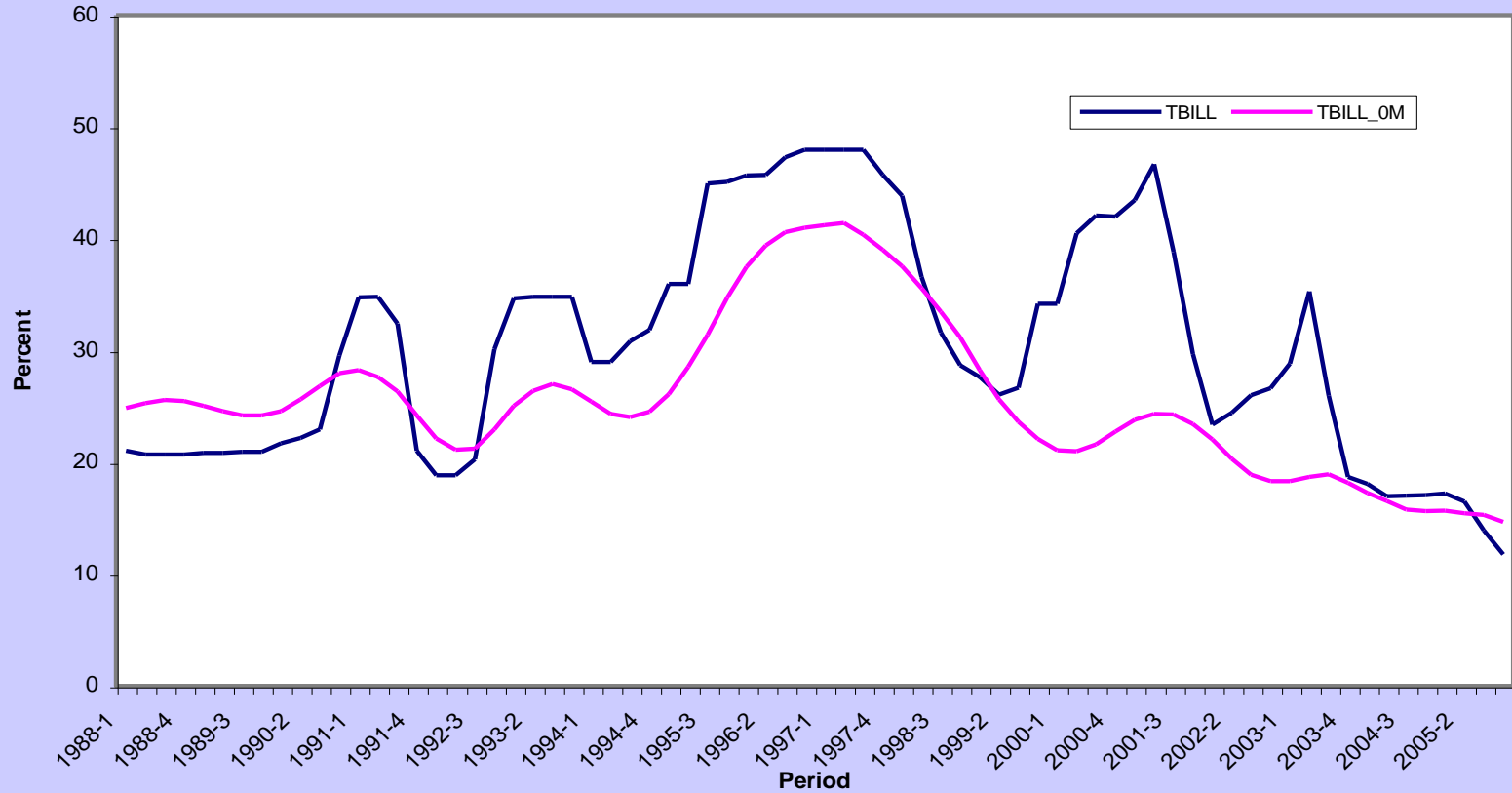
*(Below is the graphical presentation of the model solution against the actual data for the estimation period )*

# Actual vs Model Solution

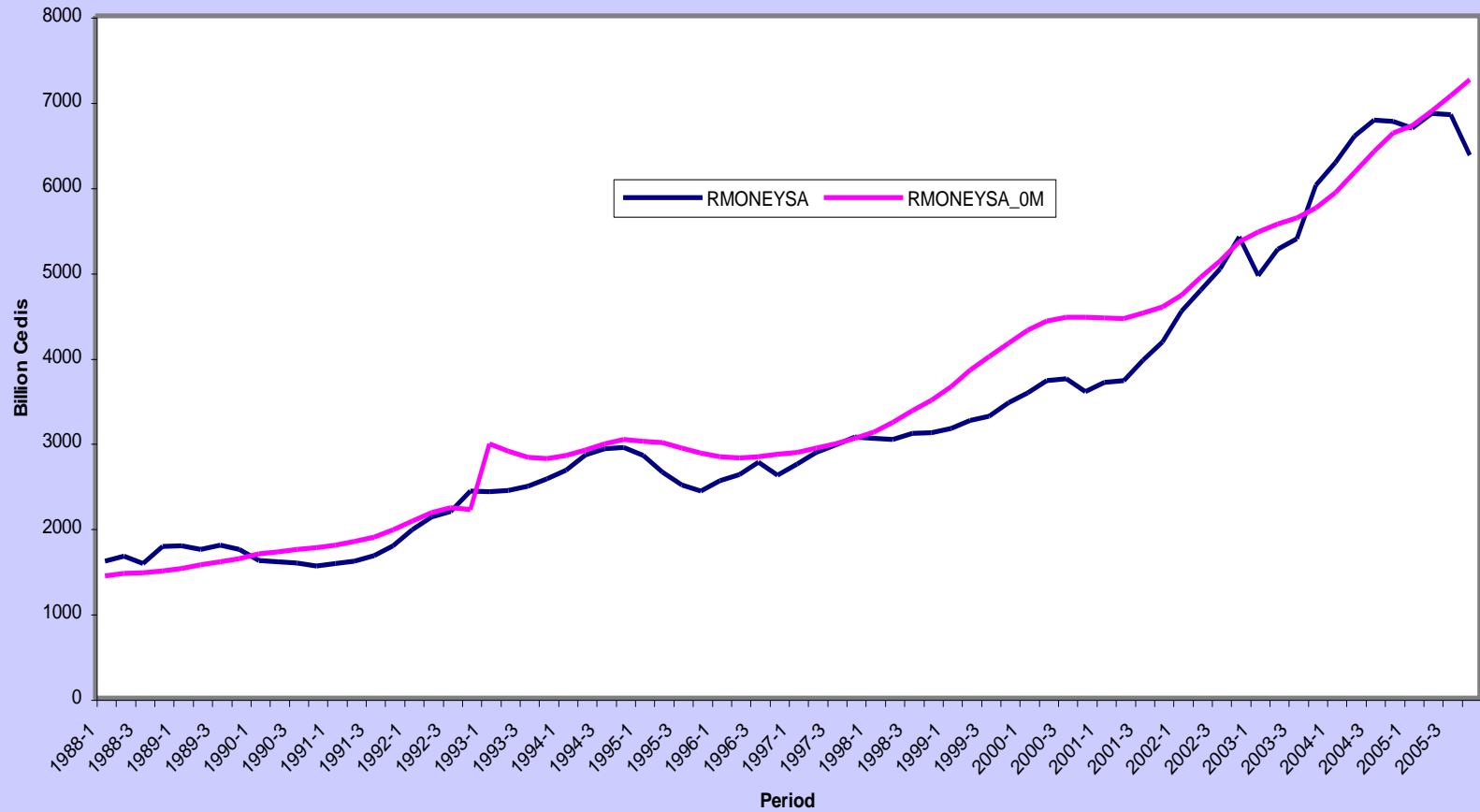
Inflation: Actual Vs Model Solution



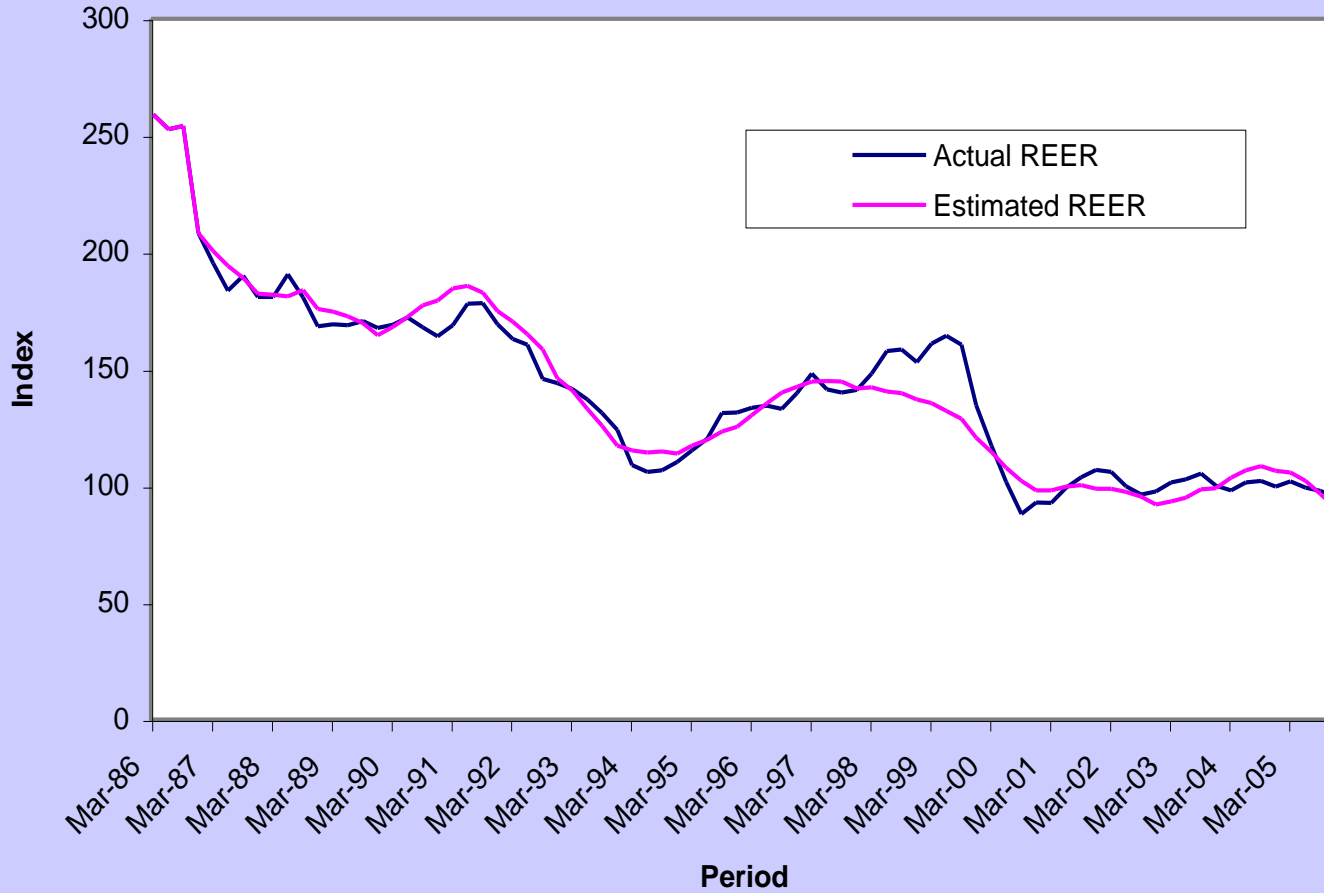
**Interest Rate: Actual Vs Model Solution**



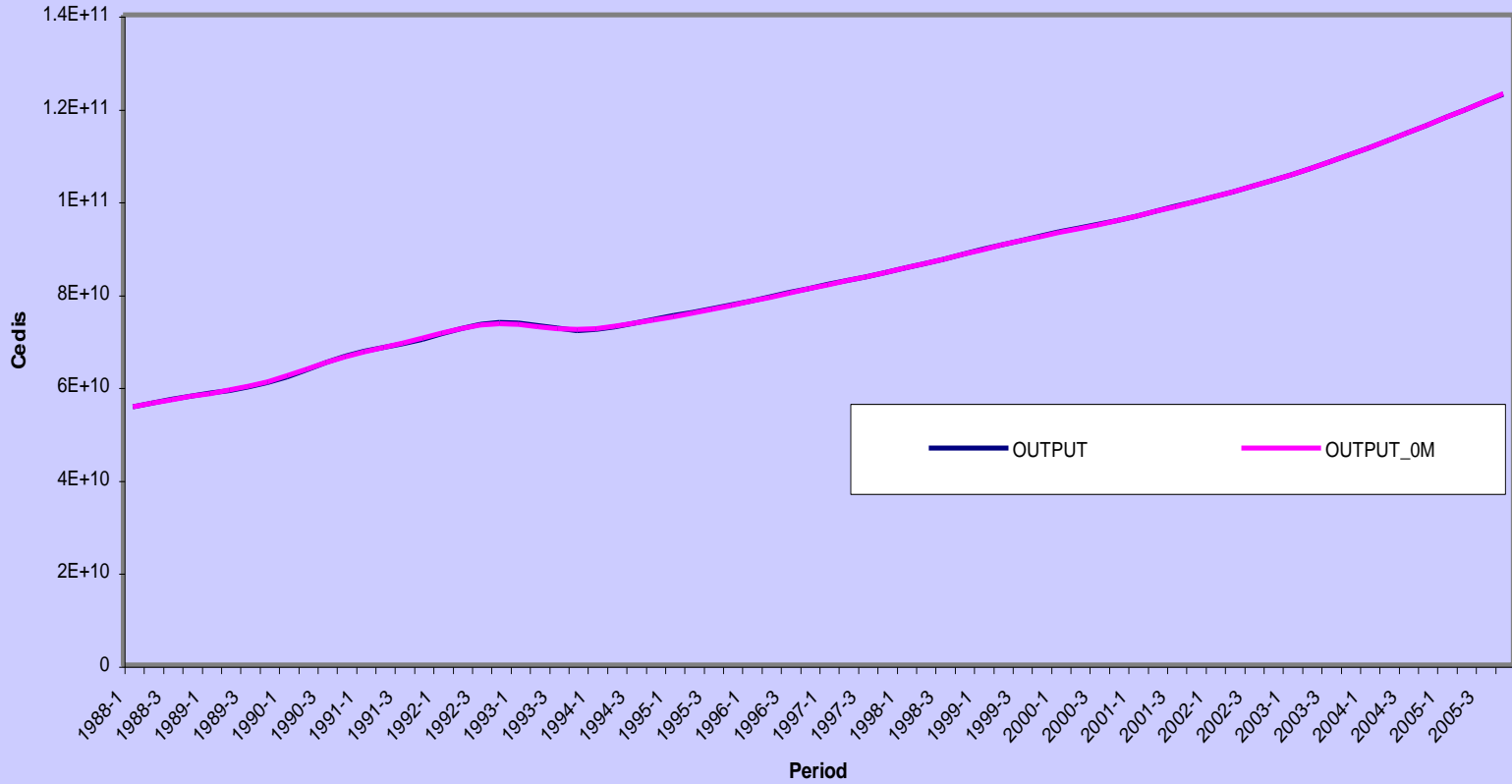
## Demand for Real Money Balances: Actual Vs Model Solution



**REER: Actual vs. Model Solution**



### Output: Actual Vs Model Solutoion



## Conclusion of the Forecasts Results

- The model should be viewed more as work in progress and a platform for empirical research within the Bank, rather than as a finished product.

# CONCLUSION

- Though we have made significant strides on this front, you can all see that we still have a lot to do to comprehensively model the entire Ghanaian economy
- Effort to reach a middle-income status as well as to meet the MDGs, needs significant translation of the macroeconomic gains into micro impact
- Hence the need for a new kind of model that that could have micro impact analysis
- Bank of Ghana is partnering other MDAs in Ghana in conjunction with International Food Policy Research Institute (IFPRI) to develop a CGE model with poverty impact analysis and financial access analysis

End of Presentation