

7th OECD Forum on African Debt Management and Bond Markets
26-28 June 2012

Analytical Tools for Debt Management Strategies: Cost at Risk Methodology

June 27, 2013

Fatos KOC
Head of Department
Turkish Treasury



Outline

■ Analytical Tools for Debt Management Strategies

- Why do we need a model?
- Cost-at-Risk Methodology
 - Practice in Turkish Treasury
- Challenges and Limitations of Modelling

Analytical Tools for Debt Management Strategies

Why do we need a model for Determining Debt Management Strategies?

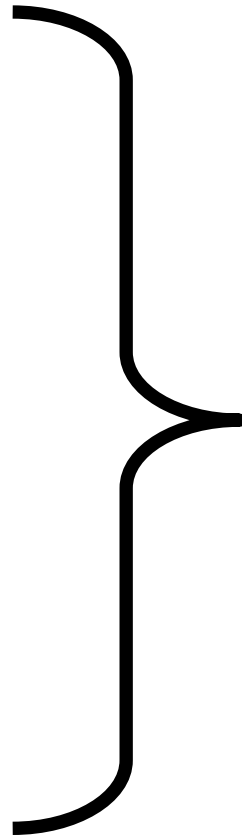
- Assess the sensitivity of public debt to market movements
- Help quantify the costs and risks associated with alternative financing strategies:
 - Provide assistance in developing the strategic guidelines

Analytical Tools for Debt Management Strategies

Setting the Benchmarks

The Need to Define
Overall
Objectives of Debt
Management

The Need for
Performance
Measurement



**Formulation of a
Benchmark
Strategy to serve
as a guideline**

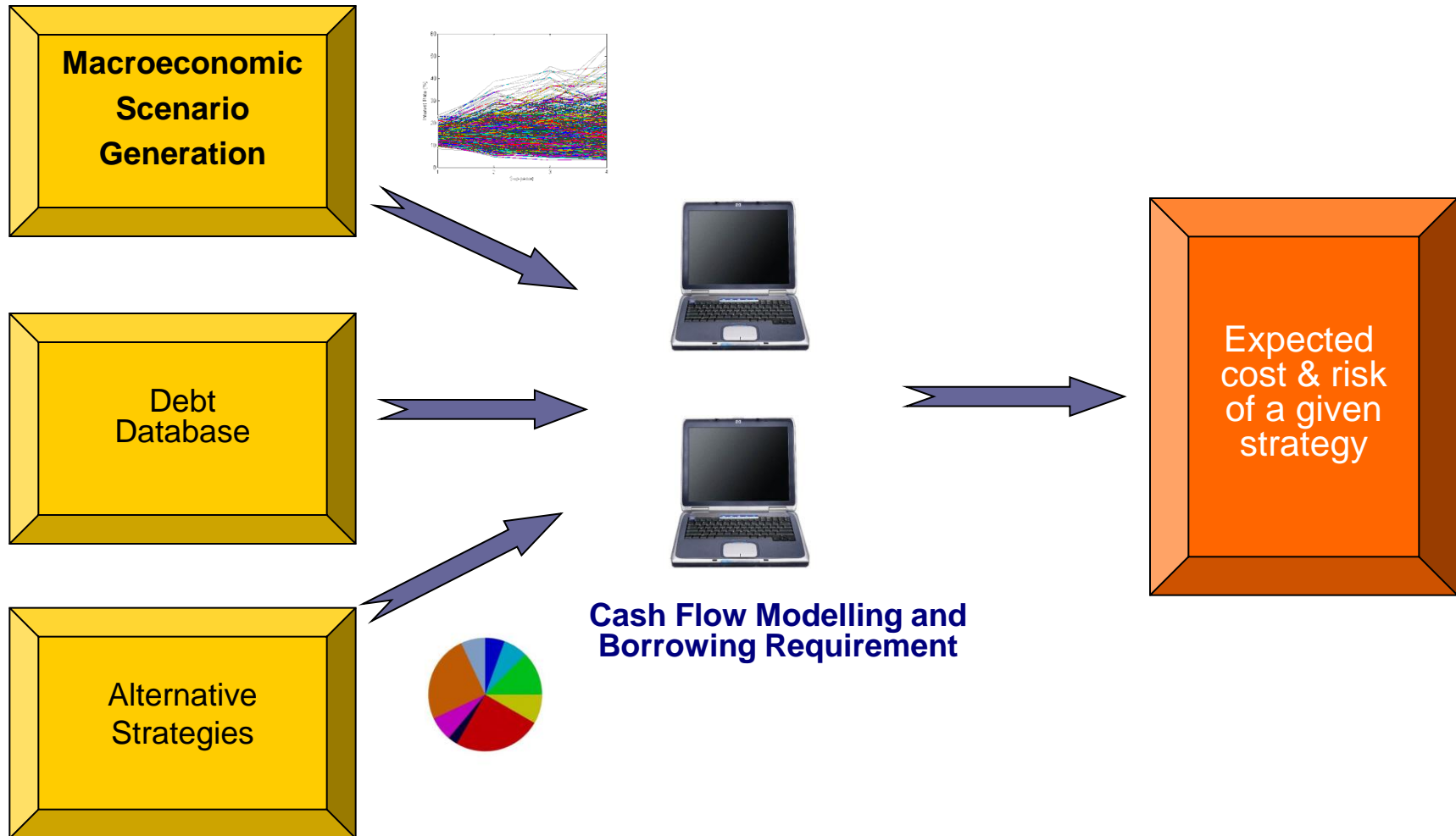
Analytical Tools for Debt Management Strategies

Modeling of Strategic Benchmarks: Cost-at-Risk (C@R) Approach

- Aims to identify probable limits within which the costs of debt may fluctuate (the degree of market risk) for a given strategy.
- Serves as a tool for comparison of alternative borrowing strategies in terms of expected costs and risks.

Analytical Tools for Debt Management Strategies

Modeling of Strategic Benchmarks: Cost-at-Risk (C@R) Approach



Analytical Tools for Debt Management Strategies

Stochastic Model: Turkish Debt Simulation Model

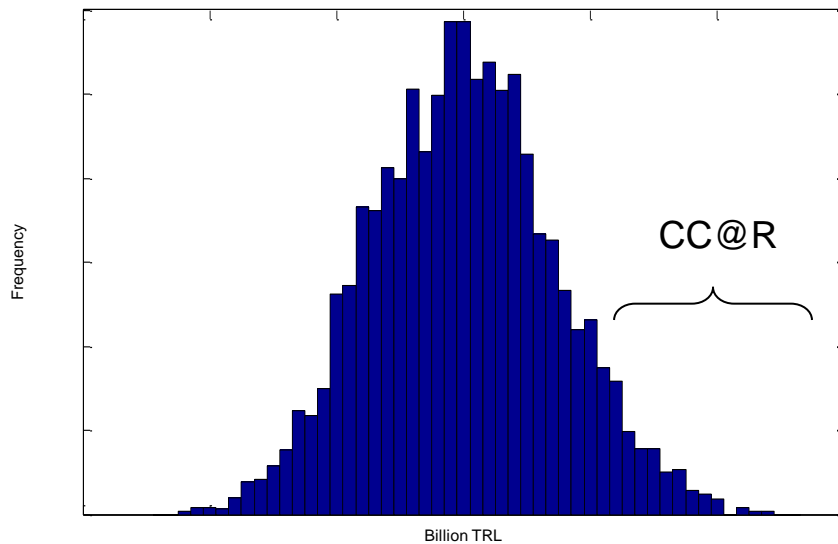
- Modifications based on changing market conditions and instrument set in 2003, 2007 and 2010
- Cost Metrics:
 - Cash-based interest expenditures
 - Level of debt stock
 - Level of inflation adjusted debt stock
- Risk Metrics: Conditional cost-at-risk (C@R)
- Platform: Matlab

Analytical Tools for Debt Management Strategies

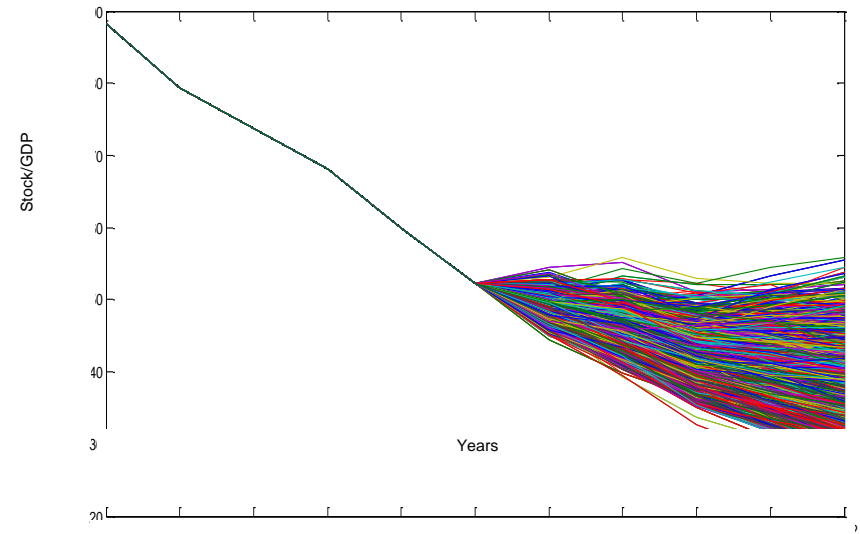
Stochastic Model: Turkish Debt Simulation Model

Illustrative Results

Distribution of Interest Payments



Distribution of Debt Stock Projections



Analytical Tools for Debt Management Strategies

Stochastic Model: Turkish Debt Simulation Model

Strategic Benchmarks for 2013-2015: The direction we would like to move

- Keeping a certain level reserve of cash : Reduce liquidity risk
- Borrowing mainly in TL in domestic cash borrowing : Reduce currency risk
- Using fixed rate TL instruments as the major source of domestic cash borrowing and decreasing the share of debt which has interest rate refixing period less than 12 months: Reduce interest rate risk
- Increasing the average maturity of domestic cash borrowing taking market conditions into consideration and decreasing the share of debt maturing within 12 months: Reduce refinancing risk

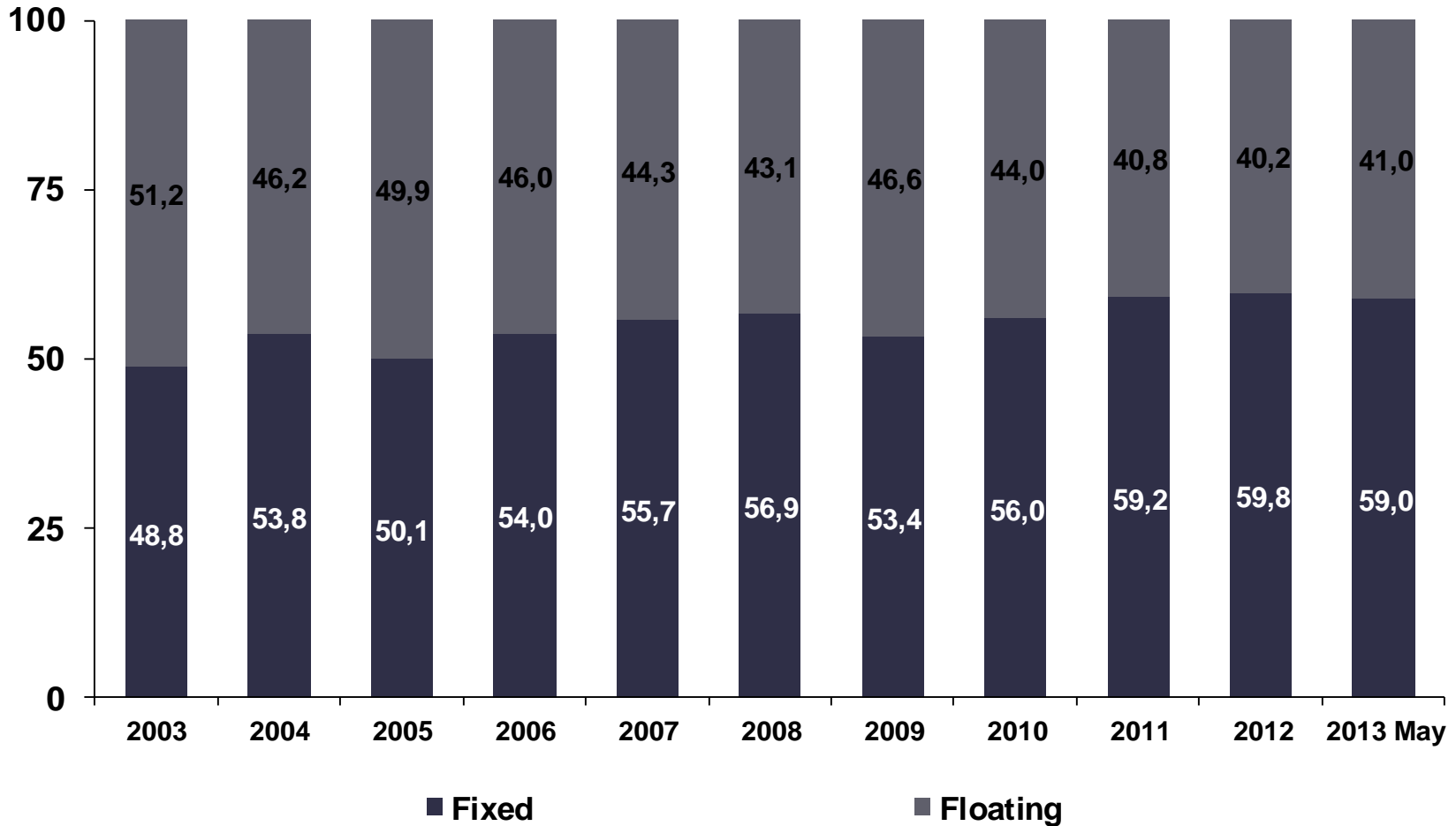
Analytical Tools for Debt Management Strategies

Modelling of Strategic Benchmarks: Complementary Analyses

- Supplemental analysis for liquidity risk management
 - Level of Liquidity Buffer
 - Debt Concentration Indicators
 - Currency composition of FX reserves
- Data analysis and modelling for volatility and co-variance of FX rates
- Evolution of yield curves

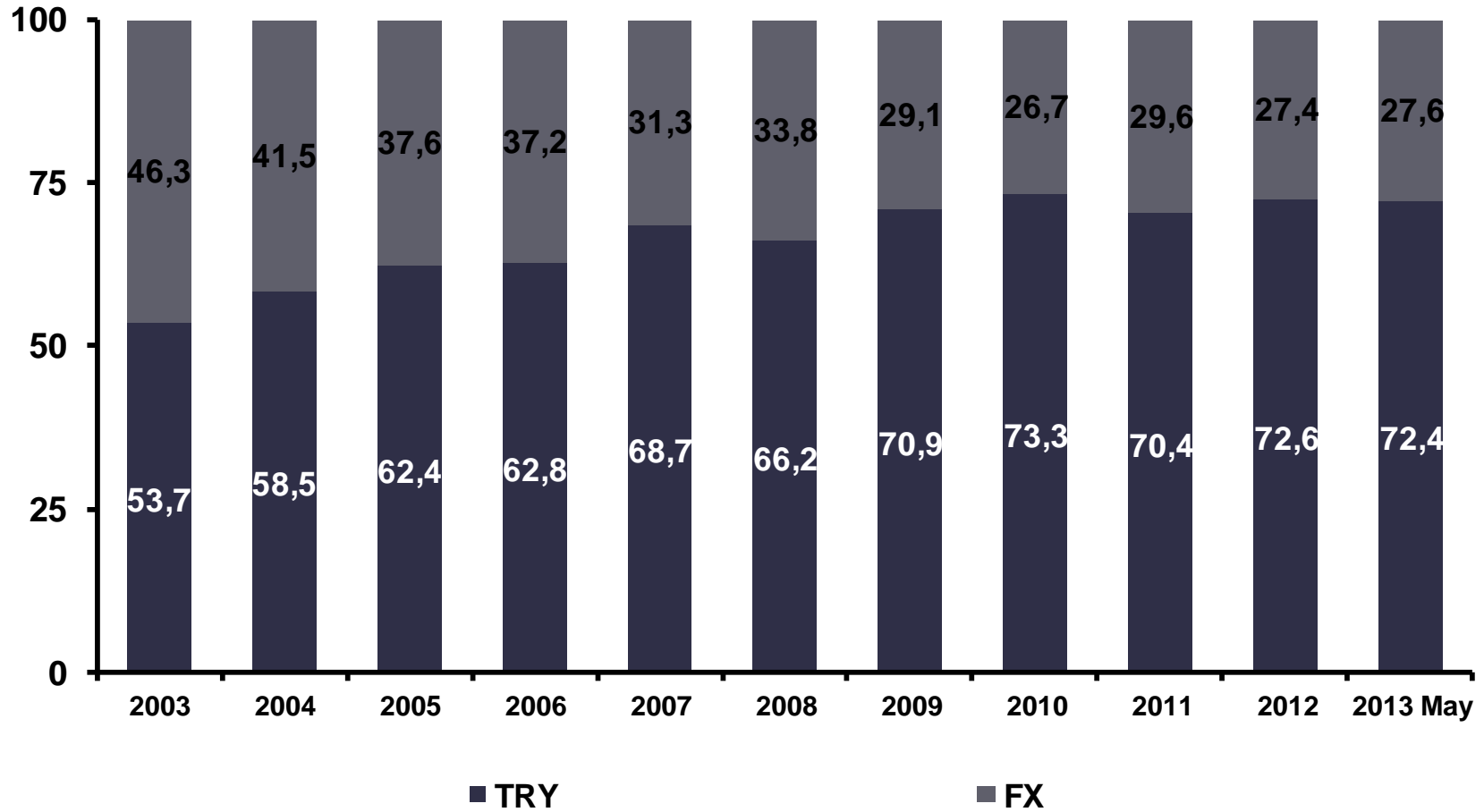
Results

Interest Composition of Central Government Gross Debt (%)



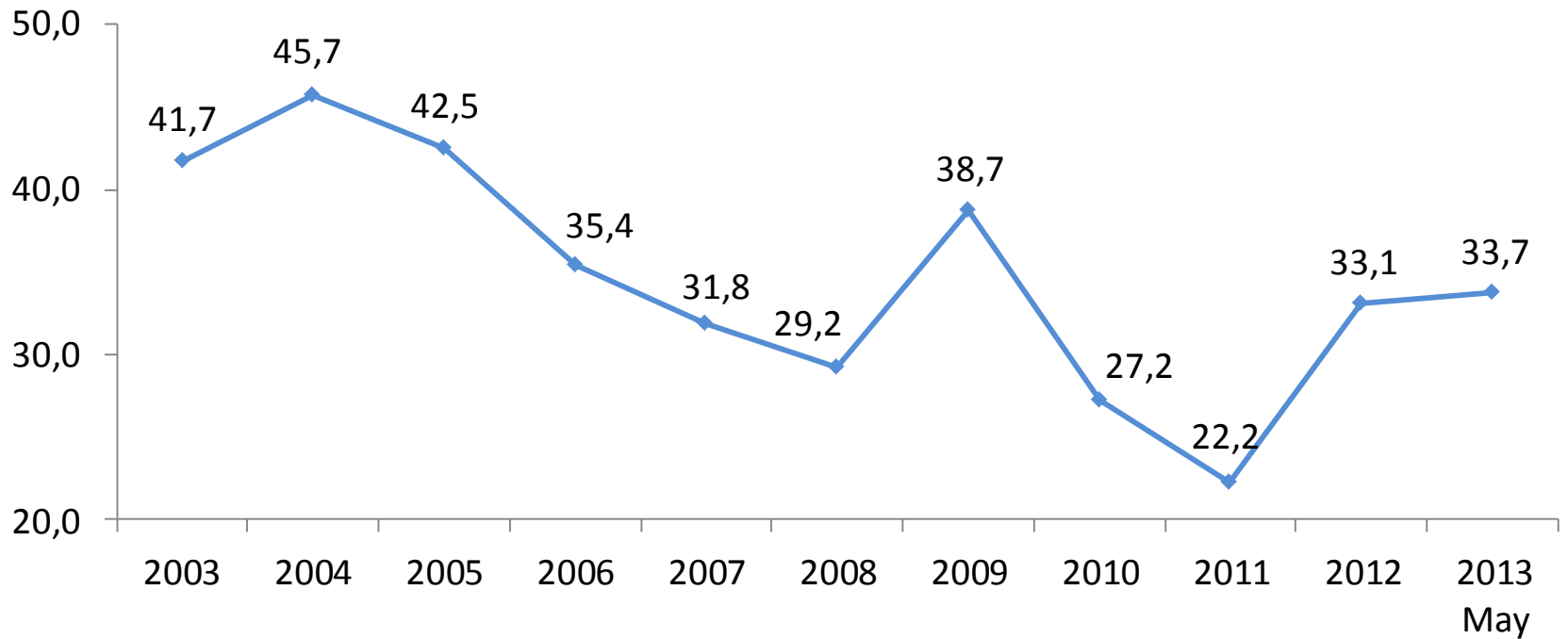
Results

Currency Composition of Central Government Gross Debt (%)



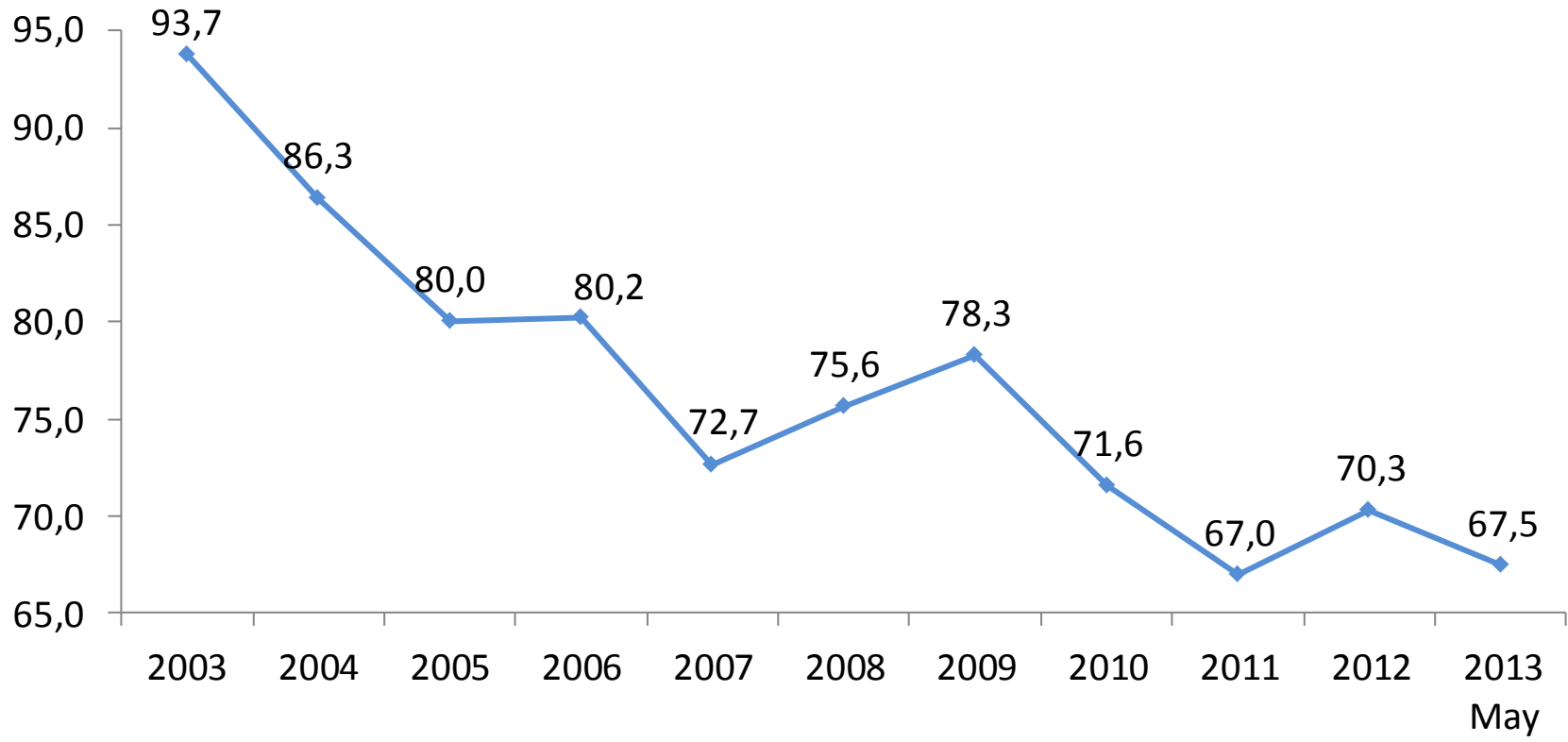
Results

Percentage of Domestic Debt Maturing within 12 Months



Results

Percentage of TL Debt Refixed within 12 Months



Analytical Tools for Debt Management Strategies

Challenges in Model Development

- **Institutional Capacity:** Committed and skilled staff, IT systems
- **Financial Resources:** For training, consulting and software expenses
- **Input Modeling :** Lack of long data series, stationarity problems in data (regime changes, financial crises)
- **Management Support :**(probably the most important one)

Analytical Tools for Debt Management Strategies

Challenges in Model Development

Decision makers need to understand

- the nature and outputs of the model
- the main assumptions
- the limitations
- robustness of recommendations

and consider

- the macroeconomic framework
- the market outlook
- other considerations of the front offices

Analytical Tools for Debt Management Strategies

Limitations of Modelling

Models that give insights are useful for policy makers. However,

- ❑ The policy problem is more complex than the standard formulation of the objective acknowledges, especially since “risk” is multidimensional.
- ❑ Scenario generation options may not enough to cope with extreme cases (event risk)
- ❑ Modelling works always need to be combined with expert judgments and common sense to make a forward looking analysis



www.treasury.gov.tr