RMSM-X in Vensim:
Refining the Financial Sector of the
THRESHOLD 21® National Development Model
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I. History of RMSM-X

The Revised Minimum Standard Model (RMSM) of the World Bank is a model which focuses on the financial flows of the economy, and its best use is found in countries which require necessary adjustments towards balancing its national accounts. It is used frequently in reparing Country Assistance Strategies (CAS) which are approved by the Bank's Board of Executive Directors as the basis for Bank strategy for each individual country. RMSM was first constructed in the early 70's to provide a framework for assessing financial needs and domestic growth opportunities. Its extended version, RMSM-X, is used extensively by the World Bank Country Operations departments for making macroeconomic projections and analyzing macroeconomic policies for all developing countries.

Over the last twenty years the original RMSM has evolved into multiple versions, of which RMSM-X has been the most popular. Actual country models of RMSM-X can vary from country to country, not only in input data, but also in model structure to adjust to the actual conditions of the country.

RMSM-X was first programmed with the spreadsheet software Javelin-Plus, and converted to Microsoft Excel about two years ago.

II. RMSM-X in Excel

II.1 Structure: RMSM-X is based upon an economic wide consistency framework of flows of funds. The basic version consists of four sectors: Government, Monetary, Foreign, and Rest of the economy (Private) sector. The projection rules are rudimentary and hence easy to understand. Each sector consists of two accounts: a current account and a capital account. Figure 1 is an overview of the flows of funds among these sectors.

RMSM-X in Excel consists of two workbooks, one as a debt module (DM.XLS) for calculating the debt flows (scheduled disbursements and payments of interest and principal), and the other as the main body of RMSM (RX.XLS) for projecting future fund flows, based on the base year data and a series of assumptions.

The Excel workbook DM.XLS has 11 worksheets (excluding the Visual Basic worksheet and the title worksheet). These worksheets vary in sizes, from 50 to over 300 lines, with each line representing a variable and its formula.

government
consumption

wages salaries and profits

private
consumption

Government
Current
Account

net transfers and interest payments

Private Current
Account

direct tax

Government
Capital
Account

net gov priv borrowing

Private Capital
Account

private
investment

government
investment

net
borrowing
from
monetary

change
private
deposits

borrowing
priv from
mon

net
borrowing
gov from for

net private
foreign
borrowing

foreign capital
account

change in foreign reserve

Monetary
Capital
Account

net transfer
for to gov

Foreign Current
Account

exports

imports

Monetary
Current
Account

net interest
priv to mon

interest
payments gov
to for

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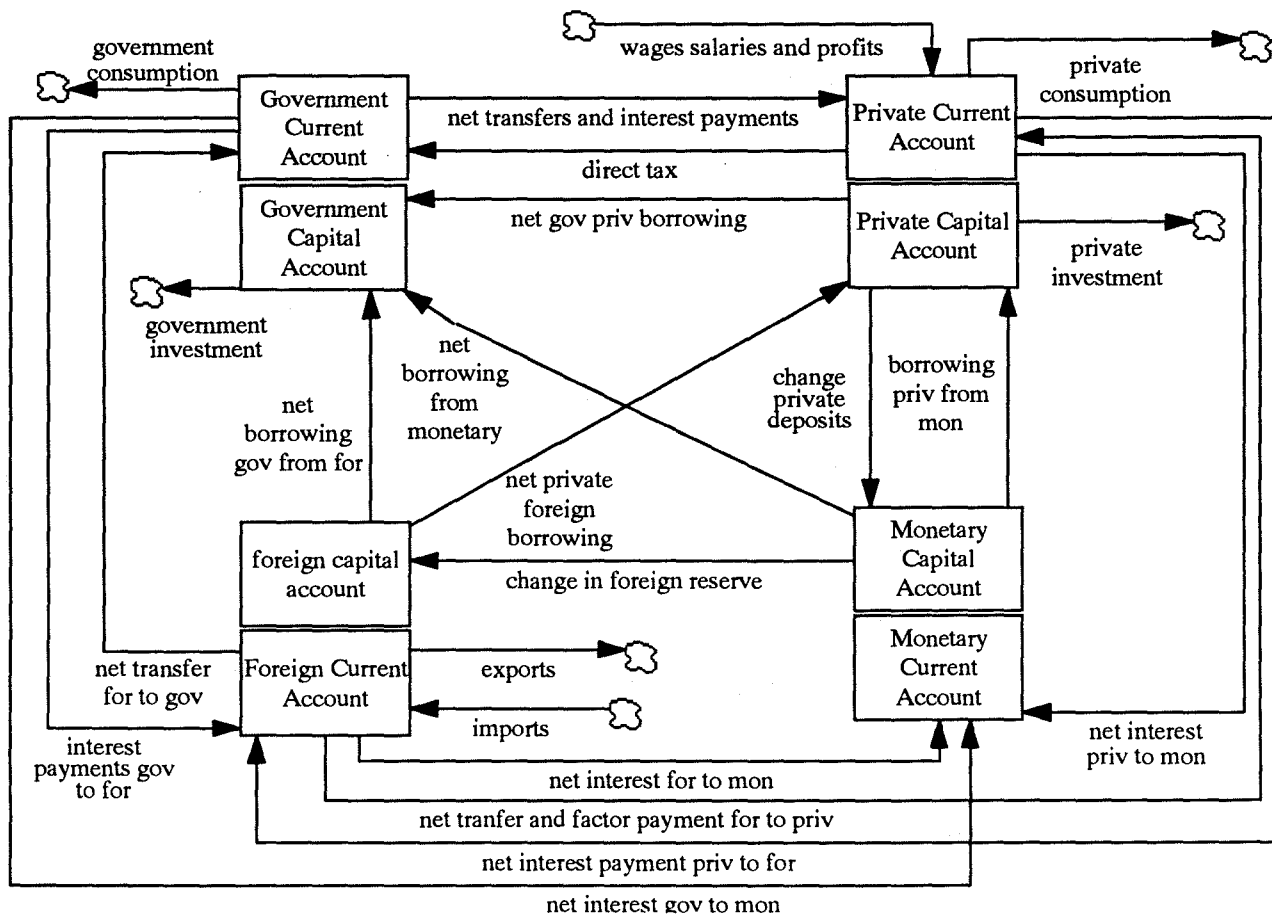net interest payment priv to for

net interest gov to mon

Figure 1: Overview of RMSM flow of funds

The workbook RX.XLS has 16 worksheets, including one for the base year data ("base year" is usually the most recent year for which a full set of data for each account is available), and another for all the assumptions used by the model for the entire projection period, such as population growth, elasticity of GDP on food imports, etc. The standard output worksheet with all the required indicators for the Bank's decision
makers is also included in this workbook.

II.2 Features: The RMSM model in Excel is programmed using Excel's (Excel 5.0) feature of Visual Basic Application. If the user has the basic knowledge about the RMSM model and the Excel software, the model is relatively easy to operate. The three closure rules, Public, Private, and Policy [1], can be easily implemented by clicking an icon on the toolbar. RX.XLS workbook also includes a worksheet for scenario comparison, which is very user-friendly. The time horizon for projection is short to medium range, up to 10 years.

The inherited weakness of the RMSM-X model is that it includes only the flows of funds in the national economic system, leaving out almost all other factors. Resource and environmental constraints are not included either.

III. Converting RMSM-X in Excel to RMSM-X in Vensim

III.1 Objective: To apply the powerful features of the modeling software Vensim [2] to such an influential model of RMSM will allow decision makers to directly use RMSM without understanding either Excel or Vensim. It will also benefit Vensim modelers when more sectors need to be added to RMSM. For other national models built in Vensim, such as THRESHOLD 21® [3], the converted model provides a basis for improving their financial sectors.

III.2 Procedure: The Demo version of RMSM in Excel which is used in the training sessions of the World Bank is selected for conversion into Vensim.

Twenty seven sketches were built in Vensim to reproduce the relationships among the 600 variables in RMSM. Equations were entered to the variables in the sketches. Because of the powerful feature of Vensim which enforces the consistency between sketches and equations, building equations correctly was a relatively efficient effort.

Assumptions, base year data, and debt data are transformed from Excel worksheets to Vensim files to provide input data to the simulation.

III.3. Some technical issues:

The starting time for RMSM-X in Excel is 1995, i.e., values of all variables are first calculated for that year, then for 1996, and so on, although the available data is for 1994. In Vensim, the time the data is available should be the time the simulation starts, so 1994 is the starting time for RMSM-X in Vensim. As a result, some variables which do not have values for 1994 in RMSM-X in Excel now has values for 1994 in Vensim.

All three closures of RMSM-X, Policy, Private, and Public, have been converted and are functional

The variables "end of period exchange rate" and "end of period GDP price index" have slightly different equations in Vensim than in Excel. In Excel version of the model the current year values of these variables are based on the assumption that future values of some other variables are already known, which we feel is not a consistent approach used for all other variables. In Vensim the equations for these variables are modified so that their current values only depend on current or earlier values of other variables.

IV. Comparison of Simulation Results from RMSM-X in Excel and RMSM -X in Vensim

These two models produced identical results for most variables. Some differences exist for other variables. The reasons for the differences are:

- Change of initial year from 1995 to 1994 (See III.3);
- Change of equations for some variables (See III.3);

V. Conclusion

The converted model of RMSM-X in Vensim proved that RMSM-X in Vensim can do everything that RMSM-X in Excel does. Once the model is converted, the powerful features of Vensim can be applied in model presentation and model modification.

VI. Acknowledgments

VII. References

1. Model building RMSM-X reference guide, World Bank, July 1995.

2. Vensim reference manual, Ventana Systems, 1995.

3. The THRESHOLD 21 sustainable development model, G.O. Barney and et el, Proceedings of 1995 International System Dynamics Conference, Tokyo, 1995.