MACROECONOMIC MODELS IMPACT ASSESSMENT METHODS OF STRUCTURAL INSTRUMENTS

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ABSTRACT

Macroeconomic models are instruments that can provide an integrated approach to the economy with the help of an mathematical model, calibrated on an mixture of techniques and taking into account changes made in all social and economic ensemble.

The Hermin model is a dynamic and multi-sector model that is used by most member states to assess the impact of structural funds on national economies and comparative trend analysis of financial transfers.

The Herom model offers the posibility of estimating the costs and benefits at a sectorial, at a global social and economic level, separately analysing multiple institutional and economic sectors and the economic policies results.

Keywords: *model, impact, instruments, macroeconomic.*

1. INTRODUCTION

Various macroeconomic models were studied assessing the impact of Structural Instruments on sustainable development such as Hermine, HEROM, QUEST and ECOMODE models. These models take into account historical data for long periods of time, by processing them with instruments, having the role of composing configurations adapted for restructural development models

Macroeconomic models take into account all the changes made in social and economic terms. The benefits of using macroeconomic modelelor is to enable estimation of costs and benefits at the sectoral level, social and global economic, can be analyzed separately several institutional and economic sectors and the effects of economic policies.

2. THE HERMIN MODEL

Various macroeconomic models were studied assessing the impact of Structural Instruments on sustainable development such as Hermine, HEROM, QUEST and ECOMODE models. These models take into account historical data for long periods of time, by processing them with instruments, having the role of composing configurations adapted for restructural development models

Hermin, is an annual model which makes an overview of the current situation and time horizon based on information retained, a prediction in two versions: with money and without money.

The Hermin model includes four sectors: manufacturing, services, agriculture and governmental services, being structured on three main elements: offer for each sector, absorption and distribution of income.

The Hermin model facilitates the study of the following facts:

The influence of commerce upon the studied economy, the potential of that economy to react to endogenous and exogenous stimulation;

features of different economic spheres, technological processes, configuration changes;

Instruments for adjusting and applying on the labour market Public and private sector contribution.

The basic ideas of this model, derive from the following elements: Community financial aid has, over the states, the efect consisting of two interrelated variables: long-term supply and short term demand.

The Cohesion Policy influence has been studied, using the HERMIN model, for two time horizons: 2000-2006 and 2007-2013.

Between 2000–2006, it was taken into consideration the aspect of payment and allocation of unexecuted expenses; Between 2007–2013, the study was based on sources provided by the General Directorate for Regional Policy, or it was based on the quantification of the average annual expenditure of the six beneficiary countries.

The Hermin model fulfills its role through a series of interconnected relationships between all its parts. The model is divided into three main components: supply, absorption and distribution of income. The model presents two scenarios:

a. With funds scenario;
b. Without funds scenario .

This model allows a general overview of the current situation and a simulation for the following interval, based on the information collected. The Hermin model began by studying the applicability on less developed regions such as Portugal, Greece, Spain, Ireland towords the impact of structural funds absorption. From this perspective, the public use of goods and services is interdependent with income and purchasing power. In the manufacturing sector, the GDP, is based on a supply – demand equality, under the incidence of global and national demand.

For a successful implementation of the Hermin model, there are certain useful schematization in the programs financed by the European Social Found:

- The relation between the number of students and number of people trained to be 15/1

- The cost of machinery, equipment, buildings should not exceed 50% of the total cost of wages;
- Students must receive an average annual income of about 50% of the average salary in the industry sector;
- The training staff should have a fee similar to the services sector;

According to the Hermin Model, the influence produces by the infrastructure development can be viewed from two angles :

- The direct impact of infrastructure development - - infrastructure stock increases from baseline - help improve the industrial output;
- Global productivity of the production factors - - will increase in the services and industrial sectors, which could have a negative effect rising unemployment, as advanced technology leads to less intensive use of labor.

Placing equity in human resources with the help of the European Social Fund - are supported by public funds.

The intensity of externalities system is determined by the level of development of human infrastructure on attracting EU funding and is calculated as:

$$Efectulexternalitatilor = KTRNR^{\eta}$$

Were:

KTRNR - Human capital stock resulting from Community financing;

 - elasticity coefficient of externalities.

Total expenditure in terms of industry and services for the industry sector, and for the services sector have a positive impact on economic progress by implementing programs.

European funding contributes to GDP growth in the short term, it reduces the interruption of financial support. The Hermin model's downside is that it does not take into account differences between realised investments and ex-ante allocation of EU funds.

3. THE HEROM MODEL

The Herom model (Romania's version of the Hermin model) has been designed for less developed economies, analysing the impact of structural founds over the economies, the variables transformation at macroeconomic level, over the pre-accession phenomena, with the purpose of uniforming national economic policies with those of the European Union.

The Hermin model was implemented in Romania between 1997–1999, by the Romanian Center of Economic Modelling (CERME), then improved through a project supported by the World Bank. This model directly addresses Romania and it's current situation, allowing also making long-term forecasts (2007-2020).

The Herom model is used to analyze and estimate forecast by the Ministry of Finance for long time horizons

The privileges of using the Herom model for estimating the impact of structural founds in the Romanian economy are:

- It represents a sectorial model, helping the evaluation of economic policies effects and highlighting developments across all sectors;
- It was done according to the overall configuration of the market economy;
- It estimates relations based on Romanian statistics, highlighting the specific parameters of the Romanian economy;
- It is approved by the European Commission, as a model for other states in the pre-accession and post-accession process.

The Herom model has the same time intervals, 2007 – 2013 and 2014 – 2020, as the Hermin model. When this model was designed, it was taken into account the future trend, not the study of past or present stage.

The model is based on micro-economic elements: the nature of the offer includes the aggregation of important instruments through which the Structural and Cohesion Funds induce productive potential effects (direct externalities on the output). There are also indirect externalities production factors embedded. (capital and human factors).

In order to estimate structural and cohesion founds impact, ex ante evaluation model included direct externalities (over the output) and indirect instruments (over the production factor). In order to evaluate the impact of structural founds, it's required that this instruments be incorporated in economical nature categories. The values allocated to various programs are centralized in three categories of expenditure:

a) investment in technical infrastructure;
b) improving human capital investment;
c) financial support for investment in the industrial sector, market services and agriculture;

The Herom model enables decision-makers, based on projections to make the appropriate decisions, offering the posibility to test various financial and fiscal policies, scenarios on the allocation of financial and material resources.

There are two scenarios for impact assessment analyzes on the structural funds in the period 2007-2013 and 2014-2020, both periods including analyzes related effects on the economy.

- "No funds" scenario – implies that structural founds are not taken into account, the financial financing between 2007 – 2013 lacks altogether, the financial aid level is based only on pre-accession founds at the end of 2006.
- "With funds" scenario – in which the structural founds taken into account are set by the National Development Plan, in terms of absorption rate of 100%. It is assumed that after 2013, funds are reduced to zero, which will generate an economic imbalance.

By confronting the two scenarios, "with" and "without" structural funds, it is clear that what differentiates them is the effect of attracting structural funds at a macroeconomic level. Range considered extends to the end of 2020 as the impact of structural funds on a wider horizon is more relevant.

Financial support from the Structural and Cohesion Funds will result in increased investment in 2020, they are expected to register a growth rate about 20% higher, due to the impact of structural funds.

4. THE QUEST MODEL

Quest is a neoclassic model - Keynesian, global macroeconomic, being able to study the impact of cohesion policy on the European Union. This model is based on the same principles as HERMIN model: financial management and appropriate investment plans. This model takes into account the assumption that public investments are as productive as private investment. There are several interpretations of economists, each version representing a completion of economic evaluations.

The Quest II model in Roeger and Veld's opinion, is configured on the following three levels:

- Household consumption is directly proportional to actual income and savings provided at a time;

$$C_i = \frac{(\theta + p)[V_i + I_i]P_i}{PC_i}, \quad (1)$$

- In the business department, organizations lead to the obtaining of GDP because of capital, labor and energy used;

$$PIB_i = \left(\left[aK_i^{-p} + (1-a)E_i^{-p} \right]^{-1/p} U_{Ki} \right)^{(1-a)} (M_i U_{Ni})^a, \quad (2)$$

- In the government department. Government expenditures are financed by income taxes, social contributions, taxes on industry, energy, VAT

$$CcG_{i\,i} = i_i G_i + ABS_i + i_i M_i + TNG_i + S_i + ATR_i - \\ -(TV_i + CAS_i + TI_i + TE_i + VAT_i + R_i) \quad (3)$$

Quest III model was designed in 2007-2013, specifically to evaluate the impact of Structural and Cohesion Funds to the new Member States. This model is divided into the following components: households, business department, research department, the monetary authority and the tax authority. In the business department, final goods producers, uses national and imported goods, weak, medium and strong qualified labor. Public investment in infrastructure accumulated public capital stock is given by the following formula:

$$K_i^G = (1 - \delta_G) K_{1-i}^G + I_i^G . \quad (4)$$

5. THE ECOMODE MODEL

ECOMODE is a computerized model for general equilibrium, being a multi-sectoral model. Using this model led to the conclusion that Member States accessing EU funding higher socio-economic benefits from significant positive effects. Observable effect of European funding will be extended further due to favorable circumstances supporting infrastructure development, improving the quality of human factor productivity growth and capital.

The development is supported by public and private sector investment, which is the most crucial element of consumer investment being maintained as a result of the decrease in unemployment and increase revenues.

ECOMODE model is divided into the following three groups:

- Investment in infrastructure services sector *INVISS*
  Investment in infrastructure in the service sector in national currency in real terms

$$INVISSR = INVISS \cdot \frac{RS}{IP} .$$

- Investments in workforce *INVFM* Investments in workforce expressed in national currency in real terms

$$INVFMR = INVFM \cdot \frac{RS}{IP} .$$

- Investments in product development *INVDP* Investment in production development in national currency in real terms

$$INVDPR = INVDP \cdot \frac{RS}{IP} .$$

6. CONCLUSIONS

Multisectoral macroeconomic evaluation models are tools able to provide a holistic approach over the computer-assisted mathematical based economy models.

Their use involves the application of econometric techniques based on statistical data on wide horizons of time and the transition to equations models, assessment of financial flows surprising directions in which changes occur in economic structure, labor or income and expenditure.

The Hermin model establishes consequences that impact the performance of application programs funding infrasturcture consequences tender with diminished effects of changes in relative prices. It is necessary that the model equations to be recalibrated annually by extrapolation of time series with a record of each variable input-output tables. The area must be detailed impact of structural funds on the factors of production, to take indirect effects of structural funds injection.

Hermin model explores the effect of a general time horizon of the Cohesion Policy, is based on the theory of growth, and was designed to study the impact of Cohesion Policy in the Member States, based on the basic idea that technical progress is determined by external factors excluding the control of economic policy, therefore, are difficult to study long-term effects in the context of accepting the possibility of increasing the productivity of factors of production.

Hermin model is a dynamic macroeconomic model, which in addition to the above virtues, manifest limitations in use among them should be emphasized in particular that this model requires a large amount of information to be applied.

Macroeconomic models have the capacity to capture reactions occurring in the economy and allow the estimation of costs and benefits across society. Unlike purely econometric models that can not be large because of lack of data on long horizons, hybrid general equilibrium models - statistical calibration has the advantage of multiple separate institutional sector analysis, and economic impact study economic policies in separate sections.

Major deficiencies are arising from the fact that most of the parameters depend on the amount of resources used. The quality of the model is closely related to the quality coefficients and applied elements which are difficult to validate.

The limits of this model should be viewed whith caution, especially in the Romanian economy, where statistical data are insuficient of inadequate fo econometrical evaluations, given the specified transition period and reduced range of time series for key variables such as those related to capital and investment types (infrastructure, machinery and equipment, etc.).

7. REFERENCES

[1] CIUPAGEA C.&MANDA A., *The Romanian HERMIN Model – ACE Project* P96-6242-R Paper, Presented in Seminar Brussels, Belgium, 1999;

[2] AMFIRESCU IULIA, *Costuri şi beneficii ale aderării la Uniunea Europeană pentru Ţările candidate din Europa Centrală si de Est*, Institutul European din România, Bucuresti, 2001;

[3] DOBRE ANA-ARIA, RAMONA COMAN (coord.), *România şi integrarea europeană*, Institutul European, Iaşi, 2005;

[4] VICTOR BOŞTINEANU - Ultimii paşi – *Absorbţia Fondurilor Structurale şi de Coeziune 2007-2013* – martie 2013;

[5] BARRY F., BRADLEY J., HANNAN A., MCCARTAN J. and Sosvilla-Rivero S., Single Market Review 1996: *Aggregate and regional impact: the cases of Greece, Spain, Ireland and Portugal*, Office for Official Publications of the European Comunities in association with Kogan page, London, 1997.